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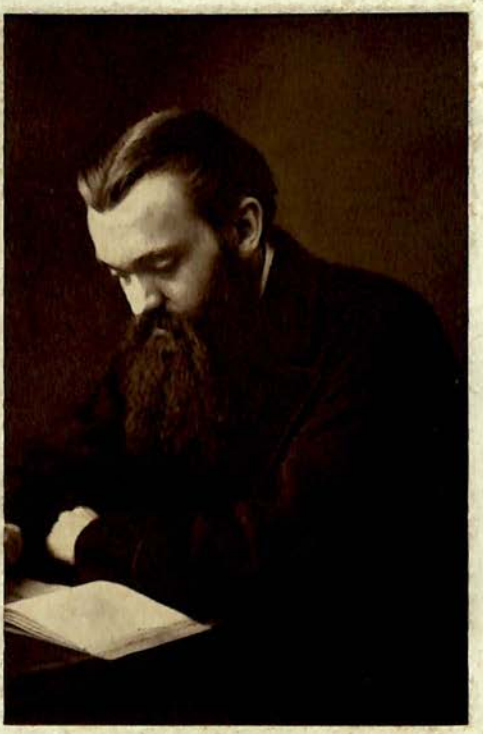
LECTURES AND ESSAYS

VOL. II.



Yours always
W. K. Clifford.

LECTURES AND ESSAYS

BY THE LATE

WILLIAM KINGDON CLIFFORD, F.R.S.

LATE PROFESSOR OF APPLIED MATHEMATICS AND MECHANICS IN UNIVERSITY COLLEGE, LONDON
AND SOMETIME FELLOW OF TRINITY COLLEGE, CAMBRIDGE

EDITED BY

LESLIE STEPHEN AND FREDERICK POLLOCK

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WITH an INTRODUCTION by F. POLLOCK

'La vérité est toute pour tous'—PAUL-LOUIS COURIER

IN TWO VOLUMES

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LECTURES AND ESSAYS

(continued)

INSTRUMENTS USED IN MEASUREMENT.[1]

By *Measurement*, for scientific purposes, is meant the measurement of *quantities*. In each special subject there are quantities to be measured; and these are very various, as may be seen from the following list of those belonging to geometry and dynamics.

Geometrical Quantities.

Lengths
Areas
Volumes
Angles (plane and solid)
Curvatures (plane and solid)
Strains (elongation, torsion, shear).

Circumstances of Motion.	*Properties of Bodies.*
Time	Mass
Velocity	Weight
Momentum	Density
Acceleration	Specific gravity
Force	Elasticity (of form and volume)
Work	Viscosity
Horse-power	Diffusion
Temperature	Surface tension
Heat.	Specific heat.

[1] ['Handbook to Loan Collection of Scientific Apparatus, 1876].

Notwithstanding the very different characters of these quantities, they are all measured by reducing them to the same kind of quantity, and estimating that in the same way. Every quantity is measured by finding a *length* proportional to the quantity, and then measuring this length. This will, perhaps, be better understood if we consider one or two examples.

The measurement of *angles* occurs in a very large majority of scientific instruments. It is always effected by measuring the *length of an arc* upon a graduated circle; the circumference of this circle being divided not into inches or centimetres, but into degrees and parts of a degree—that is, into aliquot parts of the whole circumference.

As a step towards their final measurement, some quantities, of which work is a good instance, are represented in the form of *areas*; and there seems reason to believe that this method is likely to be extended. Instruments for measuring areas are called Planimeters; and one of the simplest of these is Amsler's, consisting of two rods jointed together, the end of one being fixed and that of the other being made to run round the area which is to be measured. The second rod rests on a wheel, which turns as the rod moves; and it is proved by geometry that the area is proportional to the distance through which the wheel turns. Thus the measurement of an area is reduced to the measurement of a length.

Volumes are measured in various ways, but all depending on the same principle. Quantities of earth excavated for engineering purposes are estimated by a rough determination of the shape of the cavity, and the

measurement of its *dimensions*, namely, certain lengths belonging to it. The contents of a vessel are sometimes gauged in the same way; but the more accurate method is to fill it with liquid and then pour the liquid into a cylinder of known section, when the quantity is measured by the height of the liquid in the cylinder, that is, by a length. The volumes of irregular solids are also measured by immersing them in liquid contained in a uniform cylinder, and observing the height to which the liquid rises; that is, by measuring a length. An apparatus for this purpose is called a Stereometer. The liquid must be so chosen that no chemical action takes place between it and the solid immersed, and that it wets the solid, so that no air bubbles adhere to the surface. Thus mercury is used in the case of metals by the Standards Department.

Time is measured for ordinary purposes by the length of the arc traced out by a moving hand on a circular clock-face. For astronomical purposes it is sometimes measured by counting the ticks of a clock which beats seconds, and estimating mentally the fractions of a second; and in cases where the period of an oscillation has to be found, it is determined by counting the number of oscillations in a time sufficient to make the number considerable, and then dividing that time by the number. But by far the most accurate way of measuring time is by means of the line traced by a pencil on a sheet of paper rolled round a revolving cylinder, or a spot of light moving on a sensitive surface. If the pencil is made to move along the length of the cylinder so as to indicate what is happening as time goes along, the time of each event will be found when the

cylinder is unrolled by measuring the distance of the mark recording it from the end of the unrolled sheet, provided that the rate at which the cylinder goes round is known. In this way Helmholtz measured the rate of transmission of nerve-disturbance.

A very common case of the measurement of *force* is the barometer, which measures the pressure of the atmosphere per square inch of surface. This is determined by finding the height of the column of mercury which it will support (mercurial barometer), or the strain which it causes in a box from which the air has been taken out (aneroid barometer). The height in the former case may be measured directly, or it may first be converted into the quantity of turning of a needle, and then read off as length of arc on a graduated circle; in the latter case the strain is always indicated by a needle turning on a graduated circle.

The *mass*, and (what is proportional to it) the *weight*, of different bodies at the same place, are measured by means of a balance; and at first sight this mode of measurement seems different from those which we have hitherto considered. For we put the body to be weighed in one scale, and then put known weights into the other until equilibrium is obtained or the scale turns, and then we count the weights. But in a steelyard the weight is determined directly by means of a length; and in a balance which is accurate enough for scientific purposes, both methods are employed. We get as near as we can with the weights, and then the remainder is measured by a small rider of wire which is moved along the beam, and which determines the weight by its position; that is, by the measurement of a length.

For the measurement of weight in different places a spring-balance has to be used, and the weight is determined by the alteration it produces in the length of the spring; or else the length of the seconds pendulum is measured, from which the force of gravity on a given mass can be calculated. This last is an example of a very common and useful mode of measuring forces called into play by displacement or strain; namely, by measuring the period of the oscillations which they produce.

It seems unnecessary to consider any further examples, as all other quantities are measured by means of some simple geometrical or dynamical quantity which is proportional to them; as temperature by the height of mercury in a thermometer, heat by the quantity of ice it will melt (the volume of the resulting water), electric resistance by the length of a standard wire which has an equivalent resistance. It only remains to show how, when a length has been found proportional to the quantity to be measured, this length itself is measured.

For rough purposes, as for example in measuring the length of a room with a foot-rule, we apply the rule end on end, and count the number of times. For the piece left, we should apply the rule to it and count the number of inches. Or if we wanted a length expressed roughly for scientific purposes, we should describe it in metres or centimetres. But if it has to be expressed with greater accuracy, it must be described in hundredth, or thousandth, or millionth parts of a millimetre; and this is still done by comparing it with a scale.

But in order to estimate a length in terms of these very small quantities, it must be *magnified*; and this is done in three ways. First, geometrically, by what is called a vernier scale. This is a movable scale, which gains on the fixed one by one-tenth in each division. To measure any part of a division, we find how many divisions it takes the vernier to gain so much as that part; this is how many tenths the part is. The quantity to be measured is here geometrically multiplied by ten. Next, optically, by looking at the length and scale with a microscope or telescope. Third, mechanically, by a screw with a disc on its head, on which there is a graduated rim, called a micrometer screw. If the pitch of the screw is one-tenth and the radius of the disc ten times that of the screw, the motion is multiplied by one hundred. The two latter modes are combined together in an instrument called a micrometer-microscope. Another mechanical multiplier is a mirror which turns round and reflects light on a screen at some distance, as in Thomson's reflecting galvanometer.

Properly speaking, however, any description of a length by counting of standard lengths is imperfect and merely approximate. The true way of indicating a length is to draw a straight line which represents it on a fixed scale. And this is done by means of self-recording instruments, which measure lengths from time to time on a cylinder in the manner described above. It is only by this graphical representation of quantities that the laws of their variation become manifest, and that higher branch of measurement becomes possible which determines the nature of the connexion between two simultaneously varying quantities.

INSTRUMENTS ILLUSTRATING KINEMATICS, STATICS, AND DYNAMICS.

Science of Motion.

GEOMETRY teaches us about the sizes, the shapes, and the distances of things; to know sizes and distances we have to measure *lengths*, and to know shapes we have to measure *angles*. The science of *Motion*, which is the subject of the present sketch, tells us about the changes in these sizes, shapes, and distances which take place from time to time. A body is said to move when it changes its place or position; that is to say, when it changes its distance from surrounding objects. And when the parts of a body move relatively to one another, *i.e.* when they alter their distance from one another, the body changes in size, or shape, or both. All these changes are considered in the science of motion.

Kinematics.

The science of motion is divided into two parts: the accurate description of motion, and the investigation of the circumstances under which particular motions take place. The description of motion may again be divided into two parts, namely, that which tells us *what* changes of position take place, and that which tells us *when* and *how fast* they take place. We might, for example, describe the motion of the hands of a clock, and say that they turn round on their axes at the centre of the clock-face in such a way that the minute-hand always moves twelve times as much as the hour-hand; this is

the first part of the description of the motion. We might go on to say that when the clock is going correctly, this motion takes place uniformly, so that the minute-hand goes round once in each hour; and this would be the second part of the description. The first part is what was called Kinematics by Ampère: it tells us how the motions of the different parts of a machine depend on each other in consequence of the machinery which connects them. This is clearly an application of geometry alone, and requires no more measurements than those which belong to geometry, namely, measurements of lines and angles. But the name Kinematics is now conveniently made to include the second part also of the description of motion—when and how fast it takes place. This requires in addition the measurement of *time*, with which geometry has nothing to do. The word Kinematic is derived from the Greek *kinēma*, 'motion;' and will therefore serve equally well to bear the restricted sense given it by Ampère, and the more comprehensive sense in which it is now used. And since the principles of this science are those which guide the construction not only of scientific apparatus, but of all instruments and machines, it may be advisable to describe in some detail the chief topics with which it deals.

Dynamics.

That part of the science which tells us about the circumstances under which particular motions take place is called *Dynamics*. It is found that the change of motion in a body depends on the position and state of surrounding bodies, according to certain simple laws;

when considered as so depending on surrounding bodies, the rate of change in the quantity of motion is called *force*. Hence the name Dynamic, from the Greek *dynamis*, 'force.' The word *force* is here used in a technical sense, peculiar to the science of motion; the connexion of this meaning with the meaning which the word has in ordinary discourse will be explained further on.

Statics and Kinetics.

Dynamics are again divided into two branches: the study of those circumstances in which it is possible for a body to remain at rest is called Statics, and the study of the circumstances of actual motion is called Kinetics. The simplest part of Statics, the doctrine of the Lever, was successfully studied before any other part of the science of motion, namely by Archimedes, who proved that when a lever with unequal arms is balanced by weights at the ends of it, these weights are inversely proportional to the arms. But no real progress could be made in determining the conditions of rest, until the laws of actual motion had been studied.

Translation of Rigid Bodies.

Returning, then, to the description of motion, or Kinematics, we must first of all classify the different changes of position, of size, and of shape, with which we have to deal. We call a body *rigid* when it changes only its position, and not its size or shape, during the time in which we consider it. It is probable that every actual body is constantly undergoing slight changes of

size and shape, even when we cannot perceive them; but in Kinematics, as in most other matters, there is a great convenience in talking about only one thing at a time. So we first of all investigate changes of position on the assumption that there are no changes of size and shape; or, in technical phrase, we treat of the motion of rigid bodies. Here an important distinction is made between motion in which the body merely travels from one place to another, and motion in which it also turns round. Thus the wheels of a locomotive engine not only travel along the line, but are constantly turning round; while the coupling-bar which joins two wheels on the same side remains always horizontal, though its changes of position are considerably complicated. A change of place in which there is no rotation is called a *translation*. In a rotation the different parts of the body are moving different ways, but in a translation all parts move in the same way. Consequently, in describing a translation we need only specify the motion of any one particle of the moving body; where by a *particle* is meant a piece of matter so small that there is no need to take account of the differences between its parts, which may therefore be treated for purposes of calculation as a point.

We are thus brought down to the very simple problem of describing the motion of a point. Of this there are certain cases which have received a great deal of attention on account of their frequent occurrence in nature; such as Parabolic Motion, Simple Harmonic Motion, Elliptic Motion. We propose to say a few words in explanation of each of these.

Parabolic Motion.

The motion of a *projectile*, that is to say, of a body thrown in any direction and falling under the influence of gravity, was investigated by Galileo; and this is the first problem of Kinetics that was ever solved. We must confine ourselves here to a description of the motion, without considering the way in which it depends on the circumstance of the presence of the earth at a certain distance from the moving body. Galileo found that the path of such a body, or the curve which it traces out, is a parabola; a curve which may be described as the shadow of a circle cast on a horizontal table by a candle which is just level with the highest point of the circle.

It is convenient to consider separately the vertical and the horizontal motion, for in accordance with a law subsequently stated in a general form by Newton, these two take place in complete independence of one another. So far as its horizontal motion is concerned, the projectile moves uniformly, as if it were sliding on perfectly smooth ice; and, so far as its vertical motion is concerned, it moves as if it were falling down straight. The nature of this vertical motion may be described in two ways, each of which implies the other. First, a falling body moves faster and faster as it goes down; and the rate at which it is going at any moment is strictly proportional to the number of seconds which has elapsed since it started. Thus its downward velocity is continually being added to at a uniform rate. Secondly, the whole distance fallen from the starting-point is proportional to the *square* of the number of

seconds elapsed ; thus, in three seconds a body will fall nine times as far as it will fall in one second. The latter of these statements was experimentally proved by Galileo ; not, however, in the case of bodies falling vertically, which move too quickly for the time to be conveniently measured, but in the case of bodies falling down inclined planes, the law of which he at first assumed, and afterwards proved to be identical with that of the other. The former statement, that the velocity increases uniformly, is directly tested by an apparatus known as Attwood's machine, consisting essentially of a pulley, over which a string is hung with equal weights attached to its ends. A small bar of metal is laid on one of the weights, which begins to descend and pull the other one up ; after a measured time the bar is lifted off, and then, both sides pulling equally, the motion goes on at the rate which had been acquired at that instant. The distance travelled in one second is then measured, and gives the velocity ; this is found to be proportional to the time of falling with the bar on.

The second statement, that the space passed over is proportional to the square of the number of seconds elapsed, is verified by Morin's machine, which consists of a vertical cylinder which revolves uniformly while a body falling down at the side marks it with a pencil. The curve thus described is a record of the distance the body had fallen at every moment of time.

Fluxions.

This investigation of Galileo's was in more than one aspect the foundation of dynamical science ; but not the least important of these aspects is the proof that either

of the two ways of stating the law of falling bodies involves the other. Given that the distance fallen is proportional to the square of the time, to show that the velocity is proportional to the time itself; this is a particular case of the problem. Given where a body is at every instant, to find how fast it is going at every instant. The solution of this problem was given by Newton's Method of Fluxions. When a quantity changes from time to time, its *rate* of change is called the *fluxion* of the quantity. In the case of a moving body the quantity to be considered is the distance which the body has travelled; the fluxion of this distance is the rate at which the body is going. Newton's method solves the problem, Given *how big* a quantity is at any time, to find its fluxion at any time. The method has been called on the Continent, and lately also in England, the Differential Calculus; because the difference between two values of the varying quantity is mentioned in one of the processes that may be used for calculating its fluxion. The inverse problem, Given that the velocity is proportional to the time elapsed, to find the distance fallen, is a particular case of the general problem, Given how fast a body is going at every instant, to find where it is at any instant; or, Given the fluxion of a quantity, to find the quantity itself. The answer to this is given by Newton's Inverse Method of Fluxions; which is also called the Integral Calculus, because in one of the processes which may be used for calculating the quantity, it is regarded as a whole (integer) made up of a number of small parts. The method of Fluxions, then, or Differential and Integral Calculus, takes its start from Galileo's study of parabolic motion.

Harmonic Motion.

The ancients, regarding the circle as the most perfect of figures, believed that circular motion was not only *simple*, that is, not made up by putting together other motions, but also *perfect*, in the sense that when once set up in perfect bodies it would maintain itself without external interference. The moderns, who know nothing about perfection except as something to be aimed at, but never reached, in practical work, have been forced to reject both of these doctrines. The second of them, indeed, belongs to Kinetics, and will again be mentioned under that head. But as a matter of Kinematics it has been found necessary to treat the uniform motion of a point round a circle as compounded of two oscillations. To take again the example of a clock, the extreme point of the minute-hand describes a circle uniformly; but if we consider separately its vertical position and its horizontal position, we shall see that it not only oscillates up and down, but at the same time swings from side to side, each in the same period of one hour. If we suppose a button to move up and down in a slit between the figures XII and VI, in such a way as to be always at the same height as the end of the minute-hand, this button will have only one of the two oscillations which are combined in the motion of that point; and the other oscillation would be exhibited by a button constrained to move in a similar manner between the figures III and IX, so as always to be either vertically above or vertically below the extreme point of the minute-hand. The laws of these two motions are identical, but they are so timed that each is at its extreme position when the

other is crossing the centre. An oscillation of this kind is called a *simple harmonic motion*: the name is due to Sir William Thomson, and was given on account of the intimate connexion between the laws of such motions and the theory of vibrating strings. Indeed, the harmonic motion, simple or compound, is the most universal of all forms; it is exemplified not only in the motion of every particle of a vibrating solid, such as the string of a piano or violin, a tuning-fork, or the membrane of a drum, but in those minute excursions of particles of air which carry sound from one place to another, in the waves and tides of the sea, and in the amazingly rapid tremor of the luminiferous ether which, in its varying action on different bodies, makes itself known as light or radiant heat or chemical action. Simple harmonic motions differ from one another in three respects; in the extent or *amplitude* of the swing, which is measured by the distance from the middle point to either extreme; in the *period* or interval of time between two successive passages through an extreme position; and in the time of starting, or *epoch*, as it is called, which is named by saying what particular stage of the vibration was being executed at a certain instant of time. One of the most astonishing and fruitful theorems of mathematical science is this; that every *periodic* motion whatever, that is to say, every motion which exactly repeats itself again and again at definite intervals of time, is a compound of simple harmonic motions, whose periods are successively smaller and smaller aliquot parts of the original period, and whose amplitudes (after a certain number of them) are less and less as their periods are more rapid. The 'harmonic' tones of a string, which

are always heard along with the fundamental tone, are a particular case of these constituents. The theorem was given by Fourier in connexion with the flow of heat, but its applications are innumerable, and extend over the whole range of physical science.

The laws of combination of harmonic motions have been illustrated by some ingenious apparatus of Messrs. Tisley and Spiller, and by a machine invented by Mr. Donkin; but the most important practical application of these laws is to be found in Sir W. Thomson's Tidal Clock, and in a more elaborate machine which draws curves predicting the height of the tide at a given port for all times of the day and night with as much accuracy as can be obtained by direct observation. One special combination is worthy of notice. The union of a vertical vibration with a horizontal one of half the period gives rise to that figure of 8 which M. Marey has observed by his beautiful methods in the motion of the tip of a bird's or insect's wing.

Elliptic Motion.

The motion of the sun and moon relative to the earth was at first described by a combination of circular motions; and this was the immortal achievement of the Greek astronomers Hipparchus and Ptolemy. Indeed, in so far as these motions are periodic, it follows from Fourier's theorem mentioned above that this mode of description is mathematically sufficient to represent them; and astronomical tables are to this day calculated by a method which practically comes to the same thing. But this representation is not the simplest that can be found; it requires theoretically an infinite

number of component motions, and gives no information about the way in which these are connected with one another. We owe to Kepler the accurate and complete description of planetary or elliptic motion. His investigation applied in the first instance to the orbit of the planet Mars about the sun, but it was found true of the orbits of all planets about the sun, and of the moon about the earth. The path of the moving body in each of these motions is an ellipse, or oval shadow of a circle, a curve having various properties in relation to two internal points or foci, which replace as it were the one centre of a circle. In the case of the ellipse described by a planet, the sun is in one of these foci; in the case of the moon, the earth is in one focus. So much for the geometrical description of the motion. Kepler further observed that a line drawn from the sun to a planet, or from the earth to the moon, and supposed to move round with the moving body, would sweep out equal areas in equal times. These two laws, called Kepler's first and second laws, complete the kinematic description of elliptic motion; but to obtain formulæ fit for computation, it was necessary to calculate from these laws the various harmonic components of the motion to and from the sun, and round it; this calculation has much occupied the attention of mathematicians.

The laws of rotatory motion of rigid bodies are somewhat difficult to describe without mathematical symbols, but they are thoroughly known. Examples of them are given by the apparatus called a gyroscope, and the motion of the earth; and an application of the former to prove the nature of the latter, made by

Foucault, is one of the most beautiful experiments belonging entirely to dynamics.

Rotation.

Next in simplicity after the *translation* of a rigid body, come two kinds of motion which are at first sight very different, but between which a closer observation discovers very striking analogies. These are the motion of rotation about a fixed point, and the motion of sliding on a fixed plane. The first of these is most easily produced in practice by what is well known as a ball-and-socket joint; that is to say, a body ending in a portion of a spherical surface which can move about in a spherical cavity of the same size. The centre of the spherical surface is then a fixed point, and the motion is reduced to the sliding of one sphere inside another. In the same way, if we consider, for instance, the motion of a flat-iron on an ironing-board, we may see that this is not a pure translation, for the iron is frequently turned round as well as carried about; but the motion may be described as the sliding of one plane upon another. Thus in each case the matter to be studied is the sliding of one surface on another which it exactly fits. For two surfaces to fit one another exactly, in all positions, they must be either both spheres of the same size, or both planes; and the latter case is really included under the former, for a plane may be regarded as a sphere whose radius has increased without limit. Thus, if a piece of ice be made to slide about on the frozen surface of a perfectly smooth pond, it is really rotating about a fixed point at the centre of the earth; for the frozen surface may be regarded as part of an

enormous sphere, having that point for centre. And yet the motion cannot be practically distinguished from that of sliding on a plane.

In this latter case it is found that, excepting in the case of a pure translation, there is at every instant a certain point which is at rest, and about which as a centre the body is turning. This point is called the instantaneous centre of rotation; it travels about as the motion goes on, but at any instant its position is perfectly definite. From this fact follows a very important consequence; namely that every possible motion of a plane sliding on a plane may be produced by the *rolling* of a curve in one plane upon a curve in the other. The point of contact of the two curves at any instant is the instantaneous centre at that instant. The problems to be considered in this subject are thus of two kinds: Given the curves of rolling to find the path described by any point of the moving plane; and, Given the paths described by *two* points of the moving plane (enough to determine the motion) to find the curves of rolling and the paths of all other points. An important case of the first problem is that in which one circle rolls on another, either inside or outside; the curves described by points in the moving plane are used for the teeth of wheels. To the second problem belongs the valuable and now rapidly increasing theory of *link-work*, which, starting from the wonderful discovery of an exact parallel motion by M. Peaucellier, has received an immense and most unexpected development at the hands of Professor Sylvester, Mr. Hart, and Mr. A. B. Kempe.

Passing now to the spherical form of this motion,

we find that the instantaneous centre of rotation (which is clearly equivalent to an instantaneous axis perpendicular to the plane) is replaced by an instantaneous axis passing through the common centre of the moving spheres. In the same way the rolling of one curve on another in the plane is replaced by the rolling of one *cone* upon another, the two cones having a common vertex at the same centre.

Analogous theorems have been proved for the most general motion of a rigid body. It was shown by M. Chasles that this is always similar to the motion of a corkscrew desending into a cork; that is to say, there is always a rotation about a certain instantaneous axis, combined with translation along this axis. The amount of translation per unit of rotation is called the *pitch* of the screw. The instantaneous screw moves about as the motion goes on, but at any given instant it is perfectly definite in position and pitch. And any motion whatever of a rigid body may be produced by the rolling and sliding of one surface on another, both surfaces being produced by the motion of straight lines. This crowning theorem in the geometry of motion is due to Professor Cayley. The laws of combination of screw motions have been investigated by Dr. Ball.

Thus, proceeding gradually from the more simple to the more complex, we have been able to describe every change in the position of a body. It remains only to describe changes of size and shape. Of these there are three kinds, but they are all included under the same name—*strains*. We may have, first, a change of size without any change of shape, a uniform dilatation or contraction of the whole body in all directions, such as

happens to a sphere of metal when it is heated or cooled. Next, we may have an elongation or contraction in one direction only, all lines of this body pointing in this direction being increased or diminished in the same ratio; such as would happen to a rod six feet long and an inch square, if it were stretched to seven feet long, still remaining an inch square. Thirdly, we may have a change of shape produced by the sliding of layers over one another, a mode of deformation which is easily produced in a pack of cards; this is called a *shear*. By appropriate combinations of these three, every change of size and shape may be produced; or we may even leave out the second element, and produce any strain whatever by a dilatation or contraction, and two shears.

Dynamics.

We have already said that the change of motion of a body depends upon the position and state of surrounding bodies. To make this intelligible it will be necessary to notice a certain property of the three kinds of motion of a point which we described.

The combination of velocities may be understood from the case of a body carried in any sort of cart or vehicle in which it moves about. The whole velocity of the body is then compounded of the velocity of the vehicle and of its velocity relative to the vehicle. Thus, if a man walks across a railway carriage his whole velocity is compounded of the velocity of the railway carriage and of the velocity with which he walks across.

When the velocity of a body is changed by adding

to it a velocity in the same direction or in the opposite direction, it is only altered in amount; but when a transverse velocity is compounded with it, a change of direction is produced. Thus, if a man walks fore and aft on a steamboat, he only travels a little faster or slower; but if he walks across from one side to the other, he slightly changes the direction in which he is moving.

Now, in the parabolic motion of a projectile, we found that while the horizontal velocity continues unchanged, the vertical velocity increases at a uniform rate. Such a body is having a downwards velocity continually poured into it, as it were. This gradual change of the velocity is called *acceleration:* we may say that the acceleration of a projectile is always the same, and is directed vertically downwards.

In a simple harmonic motion it is found that the acceleration is directed towards the centre, and is always proportional to the distance from it. In the case of elliptic motion it was proved by Newton that the acceleration is directed towards the focus, and is inversely proportional to the square of the distance from it.

Let us now consider the circumstances under which these motions take place. To produce a simple harmonic motion we may take a piece of elastic string, whose length is equal to the height of a smooth table; then fasten one end of the string to a bullet and the other end to the floor, having passed it through a hole in the table, so that the bullet just rests on the top of the hole when the string is unstretched. If the bullet be now pulled away from the hole so that the string is

stretched, and then let it go, it will oscillate to and fro on either side of the hole with a simple harmonic motion. The acceleration (or rate of change of velocity) is here proportional to the distance from the hole; that is, to the *amount of elongation of the string*. It is directed towards the hole; that is, in the direction of this elongation. In the case of the moon moving round the earth, the acceleration is directed towards the earth, and is inversely proportional to the square of the distance from the earth.

In both these cases, then, the change of velocity depends upon surrounding circumstances; but in the case of the bullet, this circumstance is the strained condition of an adjoining body, namely, the elastic string; while in the case of the moon the circumstance is the position of a distant body, namely, the earth. The motion of a projectile turns out to be only a special case of the motion of the moon; for the parabola which it describes may be regarded as one end of a very long ellipse, whose other end goes round the earth's centre.

There is a remarkable difference between the two cases. The swing of the bullet depends upon its size; a large bullet will oscillate more slowly than a small one. This leads us to modify the rule. If a large bullet is equivalent to two small ones, then when it is going at the same rate it must contain twice as much motion as one of the small ones; or, as we now say, with the same velocity it has twice the *momentum*. Now the change of momentum is found to be the same for all bullets, when the momentum is reckoned as proportional to the quantity of matter in the bullet as well

as to the velocity. The quantity of matter in a body is called its *mass:* for bodies of the same substance it is, of course, simply the quantity of that substance; but for bodies of different substances it is so reckoned as to make the rule hold good. The rule for this case may then be stated thus; the change of momentum of a body (that is, the change of velocity multiplied by the mass), depends on the state of strain of adjoining bodies. Regarded as so depending, this change of momentum is called the *pressure* or *tension* of the adjoining body, according to the nature of the strain; both of these are included in the name *stress*, introduced by Rankine.

But in the case of projectiles, the acceleration is found to be the same for all bodies at the same place; and this rule holds good in all cases of planetary motion. So that it seems as if the change of velocity, and not the change of momentum, depended upon the position of distant bodies. But this case is brought under the same rule as the other by supposing that the mass of the moving body is to be reckoned among the 'circumstances.' The change of momentum is in this case called the attraction of gravitation, and we say that the attraction is proportional to the mass of the attracted body. And this way of representing the facts is borne out by the electrical and magnetic attractions and repulsions, where the change of momentum depends on the position and state of the attracting thing, and upon the electric charge or the induced magnetism of the attracted thing.

Force, then, is of two kinds; the stress of a strained adjoining body, and the attraction or repulsion of a distant body. Attempts have been made with more or

less success to explain each of these by means of the other. In common discourse the word 'force' means muscular effort exerted by the human frame. In this case the part of the human body which is in contact with the object to be moved is in a state of strain, and the force, dynamically considered, is of the first kind. But this state of strain is preceded and followed by nervous discharges, which are accompanied by the sensations of effort and of muscular strain; a complication of circumstances which does not occur in the action of inanimate bodies. What is common to the two cases is, that the change of momentum depends on the strain.

Having thus explained the law of Force, which is the foundation of Dynamics, we may consider the remaining laws of motion. It is convenient to state them first for particles, or bodies so small that we need take account only of their position. Every particle, then, has a rate of change of momentum due to the position or state of every other particle, whether adjoining it or distant from it. These are compounded together by the law of composition of velocities, and the result of the whole is the actual change of momentum of the particle. This statement, and the law of Force stated above, amount together to Newton's first and second laws of motion. His third law is, that the change of momentum in one particle, due to the position or state of another, is equal and opposite to the change of momentum in the other, due to the position or state of the first.

By the help of these laws D'Alembert showed how the motion of rigid bodies, or systems of particles, might

be dealt with. It appears from his method that two stresses, acting on a rigid body, may be equivalent, in their effect on the body as a whole, to a single stress, whose direction and position will be totally independent of the shape and nature of the body considered. The law of combination of stresses acting on a system of particles is, in fact, the same as the law of combination of velocities, so far as regards the motion of the system as a whole. This beautiful but somewhat complex result of Dynamics has been used in some text-books as the independent foundation of Statics, under the name of the parallelogram of forces; a singular inversion of the historical order and of the methods of the great writers.

When the result of all the circumstances surrounding a body is that there is no change of momentum, the body is said to be in equilibrium. In this case, if the body is at rest, it will remain so; and on this account the study of such conditions is called Statics. In dealing with the statics of rigid bodies, we have only to examine those cases in which the resultant of the external stresses and attractions acting on the body amounts to nothing. But the most important part of statics is that which finds the stresses acting in the interior of bodies between contiguous parts of them; for upon this depends the determination of the requisite strength of structures which have to bear given loads. It is found that the way in which the stress due to a given strain depends on the strain varies according to the physical nature of the body; for bodies, however, which are not crystalline or fibrous, but which have the same properties in all directions, there are two quantities which, if known, will enable us always to calculate

the stress due to a given strain.. These are, the elasticity of volume, or resistance to change of size; and the rigidity, elasticity of figure, or resistance to change of shape. Problems relating to the interior state of bodies are far more difficult than those which regard them as rigid. Thus, if a beam is supported at its two ends, it is very easy to find the portion of its weight which is borne by each support; but the determination of the state of stress in the interior is a problem of great complexity.

There is one theorem of kinetics which must be mentioned here. If we multiply half the momentum of every particle of a body by its velocity, and add all the results together, we shall get what is called the kinetic energy of the body. When the body is moved from one position to another, if we multiply each force acting on it—whether attraction or stress—by the distance moved in the direction opposite to the force, and add the results, we shall get what is called the work done against the forces during the change of position. It does not at all depend on the rate at which the change is made, but only on the two positions. If a body moves, and loses kinetic energy, it does an amount of work equal to the kinetic energy lost. If it gains kinetic energy, an amount of work equal to this gain must be done to take it back from the new position to the old one. The amount of work which must be done to take a body from a certain standard position to the position which it has at present is called the potential energy of the body. The theorem may be stated in this form; the sum of the potential and kinetic energies is always the same, provided the surrounding circumstances do

not alter. Hence the theorem is called the Conservation of Energy. It is one fact out of many that may be deduced from the equations of motion; it is not sufficient to determine the motion of a body, but it is exceedingly useful as giving a general result in cases where it might be difficult or undesirable to investigate all the particulars; and it is especially applicable to machines, the important question in regard to which is the amount of work which they can do.

It will have been seen that the science of motion depends on a few fundamental principles which are easily verified, and consists almost entirely of mathematical deductions and calculations based on those principles. It is no longer therefore an experimental science in the same sense as those are in which the fundamental facts are still being discovered. The apparatus connected with it may be conveniently classified under three heads :—

(*a*) Apparatus for illustrating theorems or solving problems of kinematics, such as those mentioned above for compounding harmonic motions. There is reason to hope for great extension of our powers in this direction.

(*b*) Apparatus for measuring the dynamical quantities, such as weight, work, and the elasticities of different substances. These are more fully classified under Measurements.

(*c*) Apparatus designed for purposes belonging to other sciences, but illustrating by its structure and functions the results of kinematics or dynamics. In this class the remainder of the collection is included.

BODY AND MIND.[1]

THE subject of this Lecture is one in regard to which a great change has recently taken place in the public mind. Some time ago it was the custom to look with suspicion upon all questions of a metaphysical nature as being questions that could not be discussed with any good result, and which, leading inquirers round and round in the same circle, never came to an end. But quite of late years there is an indication that a large number of people are waking up to the fact that Science has something to say upon these subjects; and the English people have always been very ready to hear what Science can say—understanding by Science what we shall now understand by it, that is, organized common sense.

When I say Science, I do not mean what some people are pleased to call Philosophy. The word 'philosopher,' which meant originally 'lover of wisdom,' has come in some strange way to mean a man who thinks it his business to explain everything in a certain number of large books. It will be found, I think, that in proportion to his colossal ignorance is the perfection and symmetry of the system which he sets up; because it is so much easier to put an empty room tidy than a

[1] Sunday Lecture Society, November 1, 1874; 'Fortnightly Review,' December, 1874.

full one. A man of science, on the other hand, explains as much as ever he can, and then he says, 'This is all I can do; for the rest you must ask the next man.' And with regard to such explanations as he has given, whether the next man comes at all, whether there is any next man or any further explanation or no (and we may have to wait hundreds or even thousands of years before another step is made),—yet if the original step was a scientific step, was made by true scientific methods, and was an organization of the normal experience of healthy men, that step will remain good for ever, no matter how much is left unexplained by it.

Now the supposition that this subject in itself is necessarily one which cannot be discussed to good purpose, that is to say, in such a way as to lead to definite results, is a mistake. The fact that the subject has been discussed for many hundreds of years to no good purpose, and without leading to definite results, by great numbers of people, is due to the method which was employed, and not to the subject itself; and, in fact, if we like to look in the same way upon other subjects as we have been accustomed to look upon metaphysics—if we regard every man who has written about mathematics or mechanics as having just the same right to speak and to be heard that we give to every man who has written about metaphysics—then I think we shall find that exactly the same thing can be said about the most certain regions of human science.

Those who like to read the last number of the 'Edinburgh Review,'[1] for example, will find, from an article on 'Comets and Meteors,' that it is at present quite

[1] October, 1874.

an open question whether bodies which are shot out from the sun by eruptive force may not come to circle about the sun in orbits which are like those of the planets. Now that is not an open question; the supposition is an utterly absurd one, and has been utterly absurd from the time of Kepler. Again, those who are curious enough to read a number of pamphlets that are to be found here and there may think it is an open question whether the ratio of the circumference of a circle to its diameter may not be expressed by certain finite numbers. It is not an open question to Science; it is only open to those people who do not know any Trigonometry, and who will not learn it. In exactly the same way there are numbers of questions relating to the connexion of the mind with the body which have ceased to be open questions, because Science has had her word to say about them; and they are only open now to people who do not know what that word of Science is, and who will not try to learn it.

The whole field of human knowledge may be divided roughly, for the sake of convenience, into three great regions. There are first of all what we call *par excellence* the Physical Sciences—those which deal with inanimate matter. Next, there are those sciences which deal with organic bodies—the bodies of living things, whether plants or animals, and the rules according to which those things move. And lastly, there are those sciences which make a further supposition—which suppose that besides this physical world, including both organic and inorganic bodies, there are also certain other facts, namely, that other men besides me, and most likely other animals besides men, are *conscious*.

The sciences which make that supposition are the sciences of Ethics and Politics, which are still in the practical stage, and especially the more advanced science which is now to be considered—Psychology, the Science of Mind itself; that is to say, the science of the laws which regulate the succession of feelings in any one consciousness. Each of these three great divisions began in the form of a number of perfectly disconnected subjects, between which nobody knew of any relation; but in the history of science each of them has been woven together, in consequence of connexions being found between the different subjects included in it, into a complete whole; and the further progress of the history of science requires that each of these great threads, into which all the little threads have been twined, should themselves be twined together into a single string.

With regard to the first two groups,—the group of mechanical sciences as we may call them, or the physics of inorganic bodies, and the group of biological sciences, or the physics of organic bodies—the gulf between these two has in these last days been firmly bridged over. A description of that bridge, and an account of the doctrines which form it, will be found in Professor Huxley's admirable lecture delivered at Belfast before the British Association. That bridge, as we have it now, is, in the conception of it, mainly due to Descartes; but parts of it have been worked out since his time by a vast number of physiologists, with the expenditure of an enormous amount of labour and thought. Such facts as that discovered by Harvey, that the movement of the blood was a mere

question of Hydrodynamics, and was to be explained upon the same principles as the motion of water in pipes —facts like these have been piled up, one upon another, and have gradually led to the conclusion that the science of organic bodies is only a complication of the science of inorganic bodies.

It would not be advisable here to describe in detail the stones which compose this bridge; but we have to ask whether it is possible to construct some similar bridge between the now united Science of Physics, which deals with all phenomena, whether organic or inorganic, in fact with all the material world, and the other science, the Science of Consciousness, which deals with the Laws of Mind and with the subject of Ethics. This is the question which we have now to discuss.

In order to make this bridge a firm one, so that it will not break down like those which philosophers have made, it is necessary to observe with great care what is the exact difference between the two classes of facts. If we confuse the two things together to begin with, if we do not recognize the great difference between them, we shall not be likely to find any explanation which will reduce them to some common term. The first thing, therefore, that we have to do is to realize as clearly as possible how profound the gulf is between the facts which we call Physical facts and the facts which we call Mental facts. The difference is one which has been observed from primeval times, when man or his pre-human ancestor found it not good to be alone; for the very earliest precept that we find set forth in all societies to regulate the lives of those who belong to them, is, 'Put yourself in his place;' that is to say,

ascribe to other men a consciousness which is like your own. And this belief, which the lowest savage got, that there was something else than the physical organization in other men, is the foundation of Natural Ethics as well as of the modern Science of Consciousness. But in very early times an hypothesis was formed which was supposed to make this belief easier. If you eat too much you will dream when you are asleep; if you eat too little you will dream when you are awake, or have visions; and those dreams of savages whose food was very precarious led them to a biological hypothesis. They saw in those dreams their fellows, other men, when it appeared from evidence furnished to them afterwards that those other men were not there when they were dreaming. Consequently they supposed that the actions of the organic body were caused by some other body which was not physical in the ordinary sense, which was not made of ordinary matter, and this other body was called the Soul. Animism, as Mr. Tylor calls this belief, was at first, then, an hypothesis in the domain of biology. It was a physical hypothesis to account for the peculiar way in which living things went about. But then when people had got this belief in another body which was not a physical body, after a long series of years they reasoned in this way. It is very difficult indeed to suppose that the ordinary matter which makes a man's body can be conscious. This Me is quite different from the flesh and blood which make up a man; but then as to this other body, or soul, we do not know anything about it, so that it may as well be conscious as not. That hypothesis put upon the soul, whose basis was in the phenomena of dreams, the

explanation of the consciousness which we cannot help believing to exist in other men. I have mentioned this early hypothesis on the subject, because out of it grew the almost universal custom of holding at this time of the year the Festival of the Dead which we preserve in our All Souls' Day.

But now let us see what it is that Science can tell us and what we can believe in place of that early hypothesis of our savage ancestors. In the first place, let us consider a little more narrowly what we mean by the body, and more especially what we mean by the nervous system; for it is the great discovery of Descartes that the nervous system is that part of the body which is related directly to the mind. This can hardly be better expressed than it is by the first of that series of propositions which Professor Huxley has stated in his lecture.

I. '*The brain is the organ of sensation, thought, and emotion; that is to say, some change in the condition of the matter of this organ is the invariable antecedent of the state of consciousness to which each of these terms is applied.*' We may complete this statement by saying not only that some change in the matter of this organ is the invariable antecedent, but that some other change is the invariable concomitant of sensation, thought, and emotion; and that is rather an important remark, as you will see presently.

Let us now look at the general structure of the brain and see what it is like. We can easily make a rough picture of it, which will serve our present purpose.[1] A parachute is a round piece of paper,

[1] [See the diagram at p. 43 below.]

like the top of a parasol, with strings going from its circumference to a cork. Let us imagine a parachute with two corks, a red and a blue one; each of these corks being attached by strings, not only to the circumference of our piece of paper, but to innumerable points in the inside of it. Moreover, let innumerable other strings go across from point to point of the paper, like a spider's web spun in the inside of a parasol. And the corks themselves must be tied to each other and to a third cork, say a white one, while from all three streamers fly away in all directions.

This is our diagram. Now the sheet of paper represents the *cerebral hemispheres*, a great sheet of grey nervous matter which forms the outside of your brain, and lies just under your skull. Our red and blue corks are two other masses of grey matter lying at the base of the brain, and called the *optic thalami* and the *corpora striata* respectively. The white cork is another mass of grey matter called the *medulla oblongata*, which is the top of the spinal cord. Our strings which tie part of the parachute together, and our streamers which go out in all directions from the corks, represent the nerves, white threads that run all over the body. And they are of two kinds: there are some which go to the brain from any part of the body, and others which come from the brain to it. As regards the position of the nerves this is the same thing for both of them, but it is not the same thing with regard to what they do. The nerves which are called Sensory nerves, and which go to the brain, are those which are excited whenever any part of the body is touched. When your finger is touched, a certain excitement is given to the nerves which end in

your finger, and that excitement is carried along your arm and away up to the medulla, represented by our white cork. But when you are going to move your arm the excitement starts from the brain, and goes along the other set of nerves which are called Motor nerves, or moving nerves, and goes to the muscles which work the part of the arm which you want to move. And that excitement of the nerves by purely mechanical means makes those muscles contract so as to move the part which you want to move. We have then a connexion between the brain and any part of the body which is of a double kind: there is the means of sending a message to the brain from this part of the body, and the means of taking a message from the brain to this part. The nerves which carry the message to the brain are called the 'Sensory nerves,' because they accompany what we call sensation; the nerves which carry the message from the brain are called 'Motor nerves,' because they are the agents in the motion of that part of the body.

All this is expressed in Professor Huxley's second and third propositions.

II. '*The movements of animals are due to the change of form of the muscles, which shorten and become thicker; and this change of form in a muscle arises from a motion of the substance contained within the nerves which go to the muscle.*'

III. '*The sensations of animals are due to a motion of the substance of the nerves which connect the sensory organs with the brain.*'

I pass on to his fourth proposition:—

IV. '*The motion of the matter of a sensory nerve may be transmitted through the brain to motor nerves, and*

thereby give rise to a contraction of the muscles to which these motor nerves are distributed; and this reflection of motion from a sensory into a motor nerve may take place without volition, or even contrary to it.'

Let us take that organ of sense which always occurs to us as a type of the others, because it is the most perfect—the eye. The optic nerve which runs from the eye towards the brain may be represented by one of our streamers going to the red cork, to which it is fastened by a knot that is called the 'Optic ganglion.' Supposing that you move your hand rapidly towards anybody's eye, a message with news of this movement goes along the nerve to the optic ganglion, and it comes away back again by another streamer, not direct from the ganglion, but from a point on the blue cork very near it, to the muscles which move the eyelid, and that makes the eye wink. You know that the winking of the eye, when anybody moves his hand very rapidly towards it, is not a thing which you determine to do, and which you consider about; it is a thing which happens without your interference with it; and in fact it is not you who wink your eye, but your body that does it. This is called Automatic or involuntary motion, or again it is called Reflex action, because it is a purely mechanical thing. A wave runs along that nerve, and comes back on another nerve, and that without any deliberation; and at the point where it stops and comes back it is just a reflection like the wave which you send along a string, and which comes back from the end of the string, or like a wave of water which is sent up against a sea-wall, and which reflects itself back along the sea.

V. '*The motion of any given portion of the matter of*

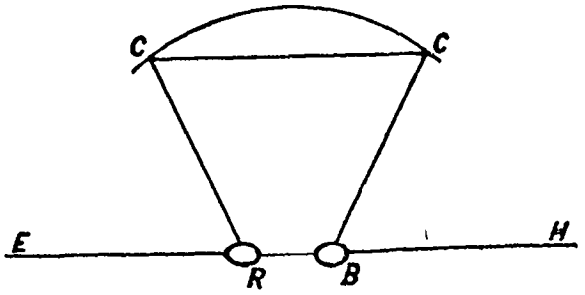
the brain, excited by the motion of a sensory nerve, leaves behind it a readiness to be moved in the same way in that part, and anything which resuscitates the motion gives rise to the appropriate feeling. This is the physical mechanism of memory.' We can, perhaps, make this a little more clear in the following manner:—Suppose two messages are sent at once to the brain; each of them is reflected back, but the two disturbances which they set up in the brain create, in some way or other, a link between them, so that when one of these disturbances is set up afterwards the other one is also set up. It is as if every time two bells of a house were rung together, that of itself made a string to tie them together, so that when you rang one bell it was necessary to ring the other bell in consequence. That, remember, is purely a physical circumstance of which we know that it happens. There is a physical excitation or disturbance which is sent along two different nerves, and which produces two different disturbances in the brain, and the effect of these two disturbances taking place together is to make a change in the character of the brain itself, so that when the one of them takes place it produces the other.

Now there are two different ways in which a stimulus coming to the eye can be made to move the hand. In the first place, suppose you are copying out a book; you have the book before you, and you read the book whilst you are copying with your hand, and consequently the light coming into your eye from the book directs your hand to move in a certain way. It is possible for this light impinging upon the eye to send a message along the optic nerve into the ganglion, and that message may go almost, though not quite, direct

to the hand, so as to make the hand move, and that causes the hand to describe the letter which you have seen in the book; or else the message may go by a longer route which takes more time. A simple experiment to distinguish between these processes was tried by Donders, the great Dutch physiologist. He made a sign to a man at a distance, and when he made this sign the man was to put down a key with his hand. He measured the time which was taken in this process, that is to say, the time which was taken by the message in going from the eye to the ganglion, and then to the hand. Measurements of the rate of nerve-motions have also been made by Helmholtz. The velocity varies to a certain extent in different people, but it is something like one hundred feet a second. But Donders also made another measurement. Suppose it is not decided beforehand whether the man is to move the key with his right or left hand, and this is to be determined by the nature of the signal, then before he can move his hand he has to decide which hand he will use. The time taken for that process of decision was also measured. That process of decision, when looked at from the physical side, means this. The message goes up from the eye to the ganglion. It is immediately connected there with the mass of grey matter represented by our red cork. From that mass of grey matter there go white threads away to the whole of the surface of the cerebral hemispheres, or the paper of our parachute, and they take that message, therefore, which comes from the eye to the ganglion away to all this grey matter which is put round the inside of your skull. There are also white threads which connect all

the parts of this grey matter together, and they run across from every part of it to almost every other part of it. As soon as a message has been taken to this grey matter, there is a vast interchange of messages going on between those parts; but finally, as the result of that, a number of messages come upon other white threads to another piece of grey matter, which is represented by our blue cork; from that the message is then taken to the muscles of the hand. There are then two different ways in which a message may go from the eye to the hand. It may go to the optic ganglion, and then almost straight to the hand, and in that case you do not know much about it—you only know that something has taken place, you do not think that you have done it yourself; or it may go to the optic ganglion, and be sent up to the cerebral hemispheres, and then be sent back to the sensory tract and then on to the hand. But that takes more time, and it implies that you have deliberated upon the act.

The diagram here drawn may make this point more clear. Here E is the eye, R and B are the red and blue



corks, and H is the hand. The curve C C represents the cerebral hemispheres, or the top of our parachute.

If the action is so habitually associated with the signal that it takes place involuntarily, without any effort of the will, the message goes from the eye to the hand along the line E R B H. This may happen with a practised performer when it is settled beforehand which hand he is to use. But if it is necessary to deliberate about the action, to call in the exercise of the will, the message goes round the loop-line, E R C C B H; from the eye to the optic thalami, from them to the cerebrum, thence to the corpora striata, and so through the medulla to the hand.

Besides this fact which we have just explained, the fact of a message going from one part of the body to the brain and coming out in the motion of some other part of the body, there is another thing which is going on continually, and that is this:—There is a faint reproduction of some excitement which has previously existed in the cerebral hemispheres, and which calls up, by the process which we have just now described, all those that have become associated with it; and it is continually sending down faint messages which do not actually tell the muscles to move, but which as it were begin to tell them to move. They are not always strong enough to produce actual motions, but they produce just the beginnings of those motions: and that process goes on even when there is apparently no sensation and no motion. If a man is in a brown study, with his eyes shut, although he apparently sees and feels nothing at all, there is a certain action going on inside his brain which is not sensation, but is like it, because it is the transmission to the cerebral hemispheres of faint messages which are copies of previous sensations; and it

does not produce motion, but it produces something like it; it produces incipient motion, the beginnings of motion which do not actually take effect. Sometimes a train of thought may so increase in strength as to produce motion. A man may get so excited by a train of thought that he jumps up and does something in consequence. And the sensory impressions which are taken from the ganglia to the hemispheres may be so strong as to produce an illusion; he may think that he sees something, he may think that he sees a ghost, when he does not. This continuous action of the brain depends upon the presence of blood; so long as the proper amount of blood is sent to the brain it is active, and when the blood is taken away it becomes inactive. And it is a curious property of the nervous system that it can direct the supply of blood which is to be sent to a particular part of it. It is possible, by directing your attention to a particular part of your hand, to make a determination of blood to that part which shall in time become a sore place. Some people have given this explanation, which seems a very probable one, of what has happened to those saints who have meditated so long upon the crucifixion that they have got what are called stigmata, that is, marks of wounds corresponding to the wounds they were thinking about.

That, then, is the general character of the nervous system which we have to consider in connexion with the mind. There is a train of facts between stimulus and motion which may be of two kinds: it may be direct or it may be indirect, it may go round the loop-line or not; and also there is a continuous action of the brain even when these steps are not taking place in

completeness. Moreover, when two actions take place simultaneously, they form a sort of link between them, so that if one of them is afterwards repeated the other gets repeated with it. That is what we have to remember chiefly as to the character of the brain.

Now let us consider the other class of facts and the connexions between them—the facts of consciousness. An eminent divine once said to me that he thought there were only two kinds of consciousness—to have a feeling, and to know that you have a feeling. It seems to me that there is only one kind of consciousness, and that is to have fifty thousand feelings at once, and to know them all in different degrees. Whenever I try to analyse any particular state of consciousness in which I am, I find that it is an extremely complex one. I cannot help at this moment having a consciousness of all the different parts of this hall, and of a great sea of faces before me; and I cannot help having the consciouness, at the same time, of all the suggestions that that picture makes, that each face represents a person sitting there and listening or not, as the case may be. And I cannot help combining with them at the same moment a number of actions which they suggest to me, and in particular the action of going on speaking. There are a great number of elements of complexity which I cannot describe, because I am so faintly conscious of them that I cannot remember them. Any state of our consciousness, then, as we are at present constituted, is an exceedingly complex thing; but it certainly possesses this property, that if two feelings have occurred together, and one of them afterwards occurs again, it is very likely that the other will be called up by it. That is to

say, two states of consciousness which have taken place at the same moment produce a link between them, so that a repetition of the one calls up a repetition of the other.

Again I find a certain train of facts between my sensations and my exertions. When I see a thing, I may go through a long process of deliberation as to what I shall do with it, and then afterwards I may do that which I have deliberated and decided upon. But, on the other hand, I may, by seeing a thing, be quite suddenly forced into doing something without any chance of deliberation at all. If I suddenly see a cab coming upon me from the corner of a street where I did not at all expect it, I jump out of the way without thinking that it is a very desirable thing to get out of the way of the cab. But if I see a cab a little while before, and have more time to think about it, then it occurs to me that it will be unpleasant and undesirable to be run over by that cab, and that I can avoid it by walking out of the way. You here see that there are in the case of the mind two distinct trains of facts between sensation and exertion. There is an involuntary train of facts when the exertion follows the sensation without asking my leave, and there is a voluntary train in which it does ask my leave.

Then, again, there is this fact: that even when there is no actual sensation and no actual exertion, there may still be a long train of facts and sensations which hang together; there may be faint reproductions of sensation which are not so vivid as are the sensations themselves, but which form a series of pictures of sensations which pass continually before my mind; and

there will be faint beginnings of action. Now the sense in which those are faint beginnings of action is very instructive. Any beginning of an action is what we call a judgment. When you see a thing, you in the first instance form no judgment about it at all—you are not prepared to assert any proposition—you merely have the feeling of a certain sight or sound presented to you; but after a very short space of time, so short that you cannot perceive it, you begin to frame propositions. If you consider what a proposition means, you will see it must correspond to the beginning of some sort of exertion. When you say that A is B, you mean that you are going to act as if A were B. If I see water with a particularly dull surface, and with stones resting upon the surface of it, then, first of all, I have merely an impression of a certain sheet of colour, and of certain objects which interrupt the colour of that sheet. But the second thing that I do is to come to the conclusion that the water is frozen, and that therefore I may walk upon it. The assertion that the water is frozen implies a bundle of resolves; which means, given certain other conditions, I shall go and walk upon it. So, then, an act of judgment or an assertion of any kind implies a certain incipient action of the muscles, not actually carried out at that time and place, but preparing a certain condition of the mind such as afterwards, when the occasion comes, will guide the action that we shall take up.

Now, then, what is it that we mean by the *character* of a person? You judge of a person's character by what he thinks and does under certain circumstances. Let us see what determines this. We

can only be speaking here of voluntary actions—those actions in which the person is consulted, and which are not done by his body without his leave. In those voluntary actions what takes place is that a certain sensation is communicated to the mind, the sensation is manipulated by the mind, and conclusions are drawn from it, and then a message is sent out which causes certain motions to take place. The character of the person is evidently determined by the nature of this manipulation. If the sensation suggests a wrong thing, the character of the person will be bad; if the sensation suggests in the great majority of cases a right thing, you will say that the character of the person is good. So, then, it is the character of the mind which determines what it will do with a given sensation, and what act will follow from it,—which determines what we call the personality of any person; and that character is persistent in the main, although it is continually changing a little. The vast mass of it is a thing which lasts through the whole of every individual's life, although everything which happens to him makes some small change in it, and that constitutes the education of the man.

Then the question arises, is there anything else in your consciousness of a different nature from what we have here described? That is a question which every man has to decide by examining his own consciousness. I do not find anything else in mine. If you find anything else in yours, it is extremely important that you should analyse it and find out all that you possibly can about it, and state it in the clearest form to other people; because it is one of the most important problems of

philosophy to account for the whole of consciousness out of individual feelings. It seems to me that the account of which I have only given a very rough sketch, which was begun by Locke and Hume, and has been carried out by their successors, chiefly in this country, is in its great general features complete, and leaves nothing but more detailed explanations to be desired. It seems to me that I find nothing in myself which is not accounted for when I describe myself as a stream of feelings such that each of them is capable of a faint repetition, and that when two of them have occurred together the repetition of the one calls up the other, and that there are rules according to which the resuscitated feeling calls up its fellows. These are, in the main, fixed rules which determine and are determined by my character; but my character is gradually changing in consequence of the education of life. It seems to me that this is a complete account of all the kinds of facts which I can find in myself; and, as I said before, if anybody finds any other kinds of facts in himself, it is an exceedingly important thing that he should describe them as clearly as he possibly can.

We have described two classes of facts; let us now notice the parallelism between them. First, we have these two parallel facts, that two actions of the brain which occur together form a link between themselves, so that the one being called up the other is called up; and two states of consciousness which occur together form a link between them, so that when one is called up the other is called up. But also we find a train of facts between the physical fact of the stimulus of light going into the eye and the physical fact of the motion of the

muscles. Corresponding to a part of that train, we have found a train of facts between sensation, the mental fact which corresponds to a message arriving from the eye, and exertion, the mental fact which corresponds to the motion of the hand by a message going out along the nerves. And we have found a correspondence between the continuous action of the brain and the continuous existence of consciousness apparently independent of sensation and exertion.

But let us look at this correspondence a little more closely; we shall find that there are one or two things which can be established with practical certainty. In the first place, it is not the whole of the physical train of facts which corresponds to the mental train of facts. The beginning of the physical train consists of light going into the eye and exciting the retina, and then of that wave of excitation being carried along the optic nerve to the ganglion. For all we know, and it is a very probable thing, the mental fact begins here, at the ganglion. There is no sensation till the message has got to the optic ganglion, for this reason, that if you press the optic nerve behind the eye you can produce the sensation of light. It is like tapping a telegraph, and sending a message which has not come from the station from which it ought to have come; nobody at the other end can tell whether it has come from that station or not. The optic ganglion cannot tell whether this message which comes along the nerve has come from the eye or is the result of a tapping of the telegraph, whether it is produced by light or by pressure upon the nerve. It is a fact of immense importance that all these nerves are exactly of the same kind. The only thing which the nerve

does is to transmit a message which has been given to it; it does not transmit a message in any other way than the telegraph wire transmits a message—that is to say, it is excited at certain intervals, and the succession of these intervals determines what this message is, not the nature of the excitation which passes along the wire. So that if we watched the nerve excited by pressure the message going along to the ganglion would be exactly the same as if it were the actual sight of the eye. We may draw from this the conclusion that the mental fact does not begin anywhere before the optic ganglion. Again, a man who has had one of his legs cut off can try to move his toes, which he feels as if they were still there; and that shows that the consciousness of the motor impulse which is sent out along the nerve does not go to the end to see whether it is obeyed or not. The only way in which we know whether our orders, given to any parts of our body, are obeyed, is by having a message sent back to say that they are obeyed. If I tell my hand to press against this black-board the only way in which I know that it does press is by having a message sent back by my skin to say that it is pressed. But supposing there is no skin there, I can have the exertion that precedes the action without actually performing it, because I can send out a message, and consciousness stops with the sending of the message, and does not know anything further. So that the mental fact is somewhere or other in the region R C C B of the diagram, and does not include the two ends. That is to say, it is not the whole of the bodily fact that the mental fact corresponds to, but only an intermediate part of it. If it just passes through the points R B, without going

round the loop from C to C, then we merely have the sensation that something has taken place—we have had no voice in the nature of it and no choice about it. If it has gone round from C to C, we have a much larger fact—we have that fact which we call choice, or the exercise of volition. We may conclude, then—I am not able in so short a space as I have to give you the whole evidence which goes to an assertion of this kind; but there is evidence which is sufficient to satisfy any competent scientific man of this day—that every fact of consciousness is parallel to some disturbance of nerve matter, although there are some nervous disturbances which have no parallel in consciousness, properly so called; that is to say, disturbances of my nerves may exist which have no parallel in my consciousness.

We have now observed two classes of facts and the parallelism between them. Let us next observe what an enormous gulf there is between these two classes of facts.

The state of a man's brain and the actions which go along with it are things which every other man can perceive, observe, measure, and tabulate; but the state of a man's own consciousness is known to him only, and not to any other person. Things which appear to us and which we can observe are called *objects* or *phenomena*. Facts in a man's consciousness are not objects or phenomena to any other man; they are capable of being observed only by him. We have no possible ground, therefore, for speaking of another man's consciousness as in any sense a part of the physical world of objects or phenomena. It is a thing entirely separate from it; and all the

evidence that we have goes to show that the physical world gets along entirely by itself, according to practically universal rules. That is to say, the laws which hold good in the physical world hold good everywhere in it—they hold good with practical universality, and there is no reason to suppose anything else but those laws in order to account for any physical fact; there is no reason to suppose anything but the universal laws of mechanics in order to account for the motion of organic bodies. The train of physical facts between the stimulus sent into the eye, or to any one of our senses, and the exertion which follows it, and the train of physical facts which goes on in the brain, even when there is no stimulus and no exertion,—these are perfectly complete physical trains, and every step is fully accounted for by mechanical conditions. In order to show what is meant by that, I will endeavour to explain another supposition which might be made. When a stimulus comes into the eye there is a certain amount of energy transferred from the ether, which fills space, to this nerve; and this energy travels along into the ganglion, and sets the ganglion into a state of disturbance which may use up some energy previously stored in it. The amount of energy is the same as before by the law of the conservation of energy. That energy is spread over a number of threads which go out to the brain, and it comes back again and is reflected from there. It may be supposed that a very small portion of energy is created in that process, and that while the stimulus is going round this loop-line it gets a little push somewhere, and then, when it comes back to the ganglia, it goes away to the muscle and sets loose a store of energy in the muscle so that it

moves the limb. Now the question is, Is there any creation of energy anywhere? Is there any part of the physical progress which cannot be included within ordinary physical laws? It has been supposed, I say, by some people, as it seems to me merely by a confusion of ideas, that there is, at some part or other of this process, a creation of energy; but there is no reason whatever why we should suppose this. The difficulty in proving a negative in these cases is similar to that in proving a negative about anything which exists on the other side of the moon. It is quite true that I am not absolutely certain that the law of the conservation of energy is exactly true; but there is no more reason why I should suppose a particular exception to occur in the brain than anywhere else. I might just as well assert that whenever anything passes over the Line, when it goes from the north side of the Equator to the south, there is a certain creation of energy, as that there is a creation of energy in the brain. If I chose to say that the amount was so small that none of our present measurements could appreciate it, it would be difficult or indeed impossible for anybody to disprove that assertion; but I should have no reason whatever for making it. There being, then, an absence of positive evidence that the conditions are exceptional, the reasons which lead us to assert that there is no loss of energy in organic any more than in inorganic bodies are absolutely overwhelming. There is no more reason to assert that there is a creation of energy in any part of an organic body, because we are not absolutely sure of the exact nature of the law, than there is reason, because we do not know what there is on the other side of the moon, to assert that

there is a sky-blue peacock there with forty-five eyes in his tail.

Therefore it is not a right thing to say, for example, that the mind is a force, because if the mind were a force we should be able to perceive it. I should be able to perceive your mind and to measure it, but I cannot; I have absolutely no means of perceiving your mind. I judge by analogy that it exists, and the instinct which leads me to come to that conclusion is the social instinct, as it has been formed in me by generations during which men have lived together; and they could not have lived together unless they had gone upon that supposition. But I may very well say that among the physical facts which go along at the same time with mental facts there are forces at work. That is perfectly true, but the two things are on two utterly different platforms—the physical facts go along by themselves, and the mental facts go along by themselves. There is a parallelism between them, but there is no interference of one with the other. Again, if anybody says that the will influences matter, the statement is not untrue, but it is nonsense. The will is not a material thing, it is not a mode of material motion. Such an assertion belongs to the crude materialism of the savage. The only thing which influences matter is the position of surrounding matter or the motion of surrounding matter. It may be conceived that at the same time with every exercise of volition there is a disturbance of the physical laws; but this disturbance, being perceptible to me, would be a physical fact accompanying the volition, and could not be the volition itself, which is not perceptible to me. Whether there is such a disturbance of the physical laws or no

is a question of fact to which we have the best of reasons for giving a negative answer; but the assertion that another man's volition, a feeling in his consciousness which I cannot perceive, is part of the train of physical facts which I may perceive,—this is neither true nor untrue, but nonsense; it is a combination of words whose corresponding ideas will not go together.

Thus we are to regard the body as a physical machine, which goes by itself according to a physical law, that is to say, is automatic. An automaton is a thing which goes by itself when it is wound up, and we go by ourselves when we have had food. Excepting the fact that other men are conscious, there is no reason why we should not regard the human body as merely an exceedingly complicated machine which is wound up by putting food into the mouth. But it is not *merely* a machine, because consciousness goes with it. The mind, then, is to be regarded as a stream of feelings which runs parallel to, and simultaneous with, a certain part of the action of the body, that is to say, that particular part of the action of the brain in which the cerebrum and the sensory tract are excited.

Then, you say, if we are automata what becomes of the freedom of the will? The freedom of the will, according to Kant, is that property which enables us to originate events independently of foreign determining causes; which, it seems to me, amounts to saying precisely that we are automata, that is, that we go by ourselves, and do not want anybody to push or pull us. The distinction between an automaton and a puppet is that the one goes by itself when it is wound up and the other requires to be pushed or pulled by wires or strings.

We do not want any stimulus from without, but we go by ourselves when we have had our food, and therefore so far as that distinction goes we are automata. But we are more than automata, because we are conscious; mental facts go along with the bodily facts. That does not hinder us from describing the bodily facts by themselves, and if we restrict our attention to them we must describe ourselves as automata.

The objection which many people feel to this doctrine is derived, I think, from the conception of such automata as are made by man. In that case there is somebody outside the automaton who has constructed it in a certain definite way, with definite intentions, and has meant it to go in that way; and the whole action of the automaton is determined by that person outside. If we consider, for example, a machine such as Frankenstein made, and imagine ourselves to have been put together as that fearful machine was put together by a German student, the conception naturally strikes us with horror; but if we consider the actual fact, we shall see that our own case is not an analogous one. For, as a matter of fact, we were not made by any Frankenstein, but we made ourselves. I do not mean that every individual has made the whole of his own character, but that the human race as a whole has made itself during the process of ages. The action of the whole race at any given time determines what the character of the race shall be in the future. From the continual storing up of the effects of such actions, graven into the character of the race, there arises in process of time that exact human constitution which we now have. By the process of natural selection all the actions of our

ancestors are built into us and form our character, and in that sense it may be said that the human race has made itself. In that sense also we are individually responsible for what the human race will be in the future, because every one of our actions goes to determine what the character of the race shall be to-morrow. If, on the contrary, we suppose that in the action of the brain there is some point where physical causes do not apply, and where there is a discontinuity, then it will follow that some of our actions are not dependent upon our character. Provided the action which goes on in my brain is a continuous one, subject to physical rules, then it will depend upon what the character of my brain is; or if I look at it from the mental side, it will depend upon what my mental character is; but if there is a certain point where the law of causation does not apply, where my action does not follow by regular physical causes from what I am, then I am not responsible for it, because it is not I that do it. So you see the notion that we are not automata destroys responsibility; because, if my actions are not determined by my character in accordance with the particular circumstances which occur, then I am not responsible for them, and it is not I that do them.

Moreover, if we once admit that physical causes are not continuous, but that there is some break, then we leave the way open for the doctrine of a destiny or a Providence outside of us, overruling human efforts and guiding history to a foregone conclusion. Now of course it is the business of the seeker after truth to find out whether a proposition is true or no, and not what are the moral consequences which may be expected to

follow from it. But I do think that if it is right to call any doctrine immoral, it is right so to call this doctrine, when we remember how often it has paralysed the efforts of those who were climbing honestly up the hill-side towards the light and the right, and how often it has nerved the sacrilegious arm of the fanatic or the adventurer who was conspiring against society.

I want now, very briefly indeed, to consider to what extent these doctrines furnish a bridge between the two classes of facts. I have said that the series of mental facts corresponds to only a portion of the action of the organism. But we have to consider not only ourselves, but also those animals which are next below us in the scale of organization, and we cannot help ascribing to them a consciousness which is analogous to our own. We find, when we attempt to enter into that, and to judge by their actions what sort of consciousness they possess, that it differs from our own in precisely the same way that their brains differ from our brains. There is less of the co-ordination which is implied by a message going round the loop-line. A much larger number of the messages which go in at a cat's eyes and come out at her paws go straight through without any loop-line at all than do so in the case of a man; but still there is a little loop-line left. And the lower we go down in the scale of organization the less of this loop-line there is; yet we cannot suppose that so enormous a jump from one creature to another should have occurred at any point in the process of evolution as the introduction of a fact entirely different and absolutely separate from the physical fact. It is impossible for anybody to point out the particular place in the line of descent where

that event can be supposed to have taken place. The only thing that we can come to, if we accept the doctrine of evolution at all, is that even in the very lowest organisms, even in the Amœba which swims about in our own blood, there is something or other, inconceivably simple to us, which is of the same nature with our own consciousness, although not of the same complexity—that is to say (for we cannot stop at organic matter, knowing as we do that it must have arisen by continuous physical processes out of inorganic matter), we are obliged to assume, in order to save continuity in our belief, that along with every motion of matter, whether organic or inorganic, there is some fact which corresponds to the mental fact in ourselves. The mental fact in ourselves is an exceedingly complex thing; so also our brain is an exceedingly complex thing. We may assume that the quasi-mental fact which corresponds and which goes along with the motion of every particle of matter is of such inconceivable simplicity, as compared with our own mental fact, with our consciousness, as the motion of a molecule of matter is of inconceivable simplicity when compared with the motion in our brain.

This doctrine is not merely a speculation, but is a result to which all the greatest minds that have studied this question in the right way have gradually been approximating for a long time.

Again, let us consider what takes place when we perceive anything by means of our eye. A certain picture is produced upon the retina of the eye, which is like the picture on the ground-glass plate in a photographic camera; but it is not there that the conscious-

ness begins, as I have shown before. When I see anything there is a picture produced on the retina, but I am not conscious of it there; and in order that I may be conscious the message must be taken from each point of this picture along the special nerve-fibre to the ganglion. These innumerable fine nerves which come away from the retina go each of them to a particular point of the ganglion, and the result is that, corresponding to that picture at the back of the retina, there is a disturbance of a great number of centres of grey matter in the ganglion. If certain parts of the retina of my eye, having light thrown upon them, are disturbed so as to produce the figure of a square, then certain little pieces of grey matter in this ganglion, which are distributed we do not know how, will also be disturbed, and the impression corresponding to that is a square. Consciousness belongs to this disturbance of the ganglion, and not to the picture in the eye; and therefore it is something quite different from the thing which is perceived. But at the same time, if we consider another man looking at something, we shall say that the fact is this—there is something outside of him which is matter in motion, and that which corresponds inside of him is also matter in motion. The external motion of matter produces in the optic ganglion something which corresponds to it, but is not like it. Although for every point in the object there is a point of disturbance in the optic ganglion, and for every connexion between two points in the object there is a connexion between two disturbances, yet they are not like one another. Nevertheless they are made of the same stuff; the object outside and the optic ganglion

are both matter, and that matter is made of molecules moving about in ether. When I consider the impression which is produced upon my mind of any fact, that is just a part of my mind; the impression is a part of me. The hall which I see now is just an impression produced on my mind by something outside of it, and that impression is a part of me.

We may conclude from this theory of sensation, which is established by the discoveries of Helmholtz, that the feeling which I have in my mind—the picture of this hall—is something corresponding, point for point, to the actual reality outside. Though every small part of the reality which is outside corresponds to a small part of my picture, though every connexion between two parts of that reality outside corresponds to a connexion between two parts of my picture, yet the two things are not alike. They correspond to one another, just as a map may be said in a certain sense to correspond with the country of which it is a map, or as a written sentence may be said to correspond to a spoken sentence. But then I may conclude from what I said before that, although the two corresponding things are not alike, yet they are made of the same stuff. Now what is my picture made of? My picture is made of exceedingly simple mental facts, so simple that I only feel them in groups. My picture is made up of these elements; and I am therefore to conclude that the real thing which is outside me, and which corresponds to my picture, is made up of similar things; that is to say, the reality which underlies matter, the reality which we perceive as matter, is that same stuff which, being compounded together in a

particular way, produces mind. What I perceive as your brain is really in itself your consciousness, is You; but then that which I call your brain, the material fact, is merely my perception. Suppose we put a certain man in the middle of the hall, and we all looked at him. We should all have perceptions of his brain; those would be facts in our consciousness, but they would be all different facts. My perception would be different from the picture produced upon you, and it would be another picture, although it might be very like it. So that corresponding to all those pictures which are produced in our minds from an external object, there is a reality which is not like the pictures, but which corresponds to them point for point, and which is made of the same stuff that the pictures are. The actual reality which underlies what we call matter is not the same thing as the mind, is not the same thing as our perception, but it is made of the same stuff. To use the words of the old disputants, we may say that matter is not of the *same* substance as mind, not *homoousion*, but it is of *like* substance, it is made of similar stuff differently compacted together, *homoiousion*.

With the exception of just this last bridge connecting the two great regions of inquiry that we have been discussing, the whole of what I have said is a body of doctrine which is accepted now, as far as I know, by all competent people who have considered the subject. There are, of course, individual exceptions with regard to particular points, such as that I have mentioned about the possible creation of energy in the brain; but these are few, and they occur mainly, I think, among

those who are so exceedingly well acquainted with one side of the subject that they regard the whole of it from the point of view of that side, and do not sufficiently weigh what may come from the other side. With such exceptions as those, and with the exception of the last speculation of all, the doctrine which I have expounded to you is the doctrine of Science at the present day.

These results may now be applied to the consideration of certain questions which have always been of great interest. The application which I shall make is a purely tentative one, and must be regarded as merely indicating that such an application becomes more possible every day. The first of these questions is that of the possible existence of consciousness apart from a nervous system, of mind without body. Let us first of all consider the effect upon this question of the doctrines which are admitted by all competent scientific men. All the consciousness that we know of is associated with a brain in a certain definite manner, namely, it is built up out of elements in the same way as part of the action of the brain is built up out of elements; an element of one corresponds to an element in the other; and the mode of connexion, the shape of the building, is the same in the two cases. The mere fact that all the consciousness we know of is associated with certain complex forms of matter need only make us exceedingly cautious not to imagine any consciousness apart from matter without very good reason indeed; just as the fact of all swans having turned out white up to a certain time made us quite rightly careful about accepting stories that involved black swans. But the fact that

mind and brain are associated in a definite way, and in that particular way that I have mentioned, affords a very strong presumption that we have here something which can be *explained*; that it is possible to find a reason for this exact correspondence. If such a reason can be found, the case is entirely altered; instead of a provisional probability which may rightly make us cautious, we should have the highest assurance that Science can give, a practical certainty on which we are bound to act, that there is no mind without a brain. Whatever, therefore, is the probability that an explanation exists of the connexion of mind with brain in action, such is also the probability that each of them involves the other.

If, however, that particular explanation which I have ventured to offer should turn out to be the true one, the case becomes even stronger. If mind is the reality or substance of that which appears to us as brain-action, the supposition of mind without brain is the supposition of an organized material substance not affecting other substances (for if it did it might be perceived), and therefore not affected by them; in other words, it is the supposition of immaterial matter, a contradiction in terms to the fundamental assumption of the uniformity of nature, without practically believing in which we should none of us have been here to-day. But if mind without brain is a contradiction, is it not still possible that an organization like the brain can exist without being perceived, without our being able to hold it fast, and weigh it, and cut it up? Now this is a physical question, and we know quite enough about the physical world to say, 'Certainly not.' It is made

of atoms and ether, and there is no room in it for ghosts.

The other question which may be asked is this: Can we regard the universe, or that part of it which immediately surrounds us, as a vast brain, and therefore the reality which underlies it as a conscious mind? This question has been considered by the great naturalist Du Bois Reymond, and has received from him that negative answer which I think we also must give. For we found that the particular organization of the brain which enables its action to run parallel with consciousness amounts to this—that disturbances run along definite channels, and that two disturbances which occur together establish links between the channels along which they run, so that they naturally occur together again. It will, I think, be clear to everyone that these are not characteristics of the great interplanetary spaces. Is it not possible, however, that the stars we can see are just atoms in some vast organism, bearing some such relation to it as the atoms which make up our brains bear to us? I am sure I do not know. But it seems clear that the knowledge of such an organism could not extend to events taking place on the earth, and that its volition could not be concerned in them. And if some vast brain existed far away in space, being invisible because not self-luminous, then, according to the laws of matter at present known to us, it could affect the solar system only by its weight.

On the whole, therefore, we seem entitled to conclude that during such time as we can have evidence of no intelligence or volition has been concerned in events happening within the range of the Solar system, except

that of animals living on the planets. The weight of such probabilities is, of course, estimated differently by different people, and the questions are only just beginning to receive the right sort of attention. But it does seem to me that we may expect in time to have negative evidence on this point of the same kind and of the same cogency as that which forbids us to assume the existence between the Earth and Venus of a planet as large as either of them.

Now, about these conclusions which I have described as probable ones, there are two things that may be said. In the first place, it may be said that they make the world a blank, because they take away the objects of very important and widespread emotions of hope and reverence and love, which are human faculties and require to be exercised, and that they destroy the motives for good conduct. To this it may be answered that we have no right to call the world a blank while it is full of men and women, even though our one friend may be lost to us. And in the regular everyday facts of this common life of men, and in the promise which it holds out for the future, there is room enough and to spare for all the high and noble emotions of which our nature is capable. Moreover, healthy emotions are felt about facts and not about phantoms; and the question is not 'What conclusion will be most pleasing or elevating to my feelings?' but 'What is the truth?' For it is not all human faculties that have to be exercised, but only the good ones. It is not right to exercise the faculty of feeling terror or of resisting evidence. And if there are any faculties which prevent us from accepting the truth and guiding our conduct by it, these

faculties ought not to be exercised. As for the assertion that these conclusions destroy the motive for good conduct, it seems to me that it is not only utterly untrue, but, because of its great influence upon human action, one of the most dangerous doctrines that can be set forth. The two questions which we have last discussed are exceedingly difficult and complex questions; the ideas and the knowledge which we used in their discussion are the product of long centuries of laborious investigation and thought; and perhaps, although we all make our little guesses, there is not one man in a million who has any right to a definite opinion about them. But it is not necessary to answer these questions in order to tell an honest man from a rogue. The distinction of right and wrong grows up in the broad light of day out of natural causes wherever men live together; and the only right motive to right action is to be found in the social instincts which have been bred into mankind by hundreds of generations of social life. In the target of every true Englishman's allegiance the bull's-eye belongs to his countrymen, who are visible and palpable and who stand around him; not to any far-off shadowy centre beyond the hills, *ultra montes*, either at Rome or in heaven. Duty to one's countrymen and fellow-citizens, which is the social instinct guided by reason, is in all healthy communities the one thing sacred and supreme. If the course of things is guided by some unseen intelligent person, then this instinct is his highest and clearest voice, and because of it we may call him good. But if the course of things is not so guided, that voice loses nothing of its sacredness, nothing of its clearness, nothing of its obligation.

In the second place it may be said that Science ought not to deal with these questions at all; that while scientific men are concerned with physical facts, they are *dans leur droit*, but that in treating of such subjects as these they are going out of their domain, and must do harm.

What is the domain of Science? It is all possible human knowledge which can rightly be used to guide human conduct.

In many parts of Europe it is customary to leave a part of the field untilled for the Brownie to live in, because he cannot live in cultivated ground. And if you grant him this grace, he will do a great deal of your household work for you in the night while you sleep. In Scotland the piece of ground which is left wild for him to live in is called 'the good man's croft.' Now there are people who indulge a hope that the ploughshare of Science will leave a sort of good man's croft around the field of reasoned truth; and they promise that in that case a good deal of our civilizing work shall be done for us in the dark, by means we know nothing of. I do not share this hope; and I feel very sure that it will not be realized: I think that we should do our work with our own hands in a healthy straightforward way. It is idle to set bounds to the purifying and organizing work of Science. Without mercy and without resentment she ploughs up weed and briar; from her footsteps behind her grow up corn and healing flowers; and no corner is far enough to escape her furrow. Provided only that we take as our motto and our rule of action, Man speed the plough.

ON THE NATURE OF THINGS-IN-THEMSELVES.[1]

Meaning of the Individual Object.

My feelings arrange and order themselves in two distinct ways. There is the internal or subjective order, in which sorrow succeeds the hearing of bad news, or the abstraction 'dog' symbolizes the perception of many different dogs. And there is the external or objective order, in which the sensation of letting go is followed by the sight of a falling object and the sound of its fall. The objective order, *quâ* order, is treated by physical science, which investigates the uniform relations of *objects* in time and space. Here the word *object* (or *phenomenon*) is taken merely to mean a group of my feelings, which persists as a group in a certain manner; for I am at present considering only the objective order of my feelings. The object, then, is a set of changes *in* my consciousness, and not anything out of it. Here is as yet no metaphysical doctrine, but only a fixing of the meaning of a word. We may subsequently find reason to infer that there is something which is not object, but which corresponds in a certain way with the object; this will be a metaphysical doctrine, and neither it nor its denial is involved in the present determination of meaning. But the determination must be taken as extending to all those inferences which are made by

[1] 'Mind,' January, 1878.

science in the objective order. If I hold that there is hydrogen in the sun, I mean that if I could get some of it in a bottle, and explode it with half its volume of oxygen, I should get that group of possible sensations which we call 'water.' The inferences of physical science are all inferences of my real or possible feelings; inferences of something actually or potentially in my consciousness, not of anything outside it.

Distinction of Object and Eject.

There are, however, some inferences which are profoundly different from those of physical science. When I come to the conclusion that *you* are conscious, and that there are objects in your consciousness similar to those in mine, I am not inferring any actual or possible feelings of my own, but *your* feelings, which are not, and cannot by any possibility become, objects in my consciousness. The complicated processes of your body and the motions of your brain and nervous system, inferred from evidence of anatomical researches, are all inferred as things possibly visible to me. However remote the inference of physical science, the thing inferred is always a part of me, a possible set of changes in my consciousness bound up in the objective order with other known changes. But the inferred existence of your feelings, of objective groupings among them similar to those among my feelings, and of a subjective order in many respects analogous to my own,—these inferred existences are in the very act of inference *thrown out* of my consciousness, recognised as outside of it, as *not* being a part of me. I propose, accordingly, to call these inferred existences *ejects*, things thrown out

of my consciousness, to distinguish them from *objects*, things presented in my consciousness, phenomena. It is to be noticed that there is a set of changes of my consciousness symbolic of the eject, which may be called my conception of you; it is (I think) a rough picture of the whole aggregate of my consciousness, under imagined circumstances like yours; *quâ* group of my feelings, this conception is like the object in substance and constitution, but differs from it in implying the existence of something that is not itself, but corresponds to it, namely, of the eject. The existence of the object, whether perceived or inferred, carries with it a group of beliefs; these are always beliefs in the future sequence of certain of my feelings. The existence of this table, for example, as an object in my consciousness, carries with it the belief that if I climb up on it I shall be able to walk about on it as if it were the ground. But the existence of my conception of you in my consciousness carries with it a belief in the existence of you outside of my consciousness, a belief which can never be expressed in terms of the future sequence of my feelings. How this inference is justified, how consciousness can testify to the existence of anything outside of itself, I do not pretend to say; I need not untie a knot which the world has cut for me long ago. It may very well be that I myself am the only existence; but it is simply ridiculous to suppose that anybody else is. The position of absolute idealism may, therefore, be left out of count, although each individual may be unable to justify his dissent from it.

Formation of the Social Object.

The belief, however, in the existence of other men's consciousness, in the existence of ejects, dominates every thought and every action of our lives. In the first place, it profoundly modifies the object. This room, the table, the chairs, your bodies, are all objects in my consciousness; as simple objects, they are parts of me. But I somehow infer the existence of similar objects in your consciousness, and these are not objects to me, nor can they ever be made so; they are ejects. This being so, I bind up with each object as it exists in my mind the thought of similar objects existing in other men's minds; and I thus form the complex conception, 'this table, as an object in the minds of men,'—or, as Mr. Shadworth Hodgson puts it, an object of consciousness in general. This conception symbolizes an indefinite number of ejects, together with one object which the conception of each eject more or less resembles. Its character is therefore mainly ejective in respect of what it symbolises, but mainly objective in respect of its nature. I shall call this complex conception the *social object*; it is a symbol of one thing (the *individual object*, it may be called for distinction's sake) which is in my consciousness, and of an indefinite number of other things which are ejects and out of my consciousness. Now, it is probable that the individual object, as such, never exists in the mind of man. For there is every reason to believe that we were gregarious animals before we became men properly so called. And a belief in the eject—some sort of recognition of a kindred consciousness in one's fellow-beings—is clearly a condition

of gregarious action among animals so highly developed as to be called conscious at all. Language, even in its first beginnings, is impossible without that belief; and any sound which, becoming a sign to my neighbour, becomes thereby a mark to myself, must by the nature of the case be a mark of the social object, and not of the individual object. But if not only this conception of the particular social object, but all those that have been built up out of it, have been formed at the same time with, and under the influence of, language, it seems to follow that the belief in the existence of other men's minds like our own, but not part of us, must be inseparably associated with every process whereby discrete impressions are built together into an object. I do not, of course, mean that it presents itself in consciousness as distinct; but I mean that as an object is formed in my mind, a fixed habit causes it to be formed as a social object, and insensibly embodies in it a reference to the minds of other men. And this sub-conscious reference to supposed ejects is what constitutes the impression of *externality* in the object, whereby it is described as *not-me*. At any rate, the formation of the social object supplies an account of this impression of outness, without requiring me to assume any ejects or things outside my consciousness except the minds of other men. Consequently, it cannot be argued from the impression of outness that there is anything outside of my consciousness except the minds of other men. I shall argue presently that we have grounds for believing in non-personal ejects, but these grounds are not in any way dependent on the impression of outness, and they are not included in the ordinary or common-sense view of

things. It seems to me that the prevailing belief of uninstructed people is merely a belief in the social object, and not in a non-personal eject, somehow corresponding to it; and that the question whether the latter exists or not is one which cannot be put to them so as to convey any meaning without considerable preliminary training. On this point I agree entirely with Berkeley, and not with Mr. Spencer.

Difference between Mind and Body.

I do not pause to show how belief in the Eject underlies the whole of natural ethic, whose first great commandment, evolved in the light of day by healthy processes wherever men have lived together, is, 'Put yourself in his place.' It is more to my present purpose to point out what is the true difference between body and mind. Your body is an object in my consciousness; your mind is not, and never can be. Being an object, your body follows the laws of physical science, which deals with the objective order of my feelings. That its chemistry is ordinary chemistry, its physics ordinary physics, its mechanics ordinary mechanics, may or may not be true; the circumstances are exceptional, and it is conceivable (to persons ignorant of the facts) that allowance may have to be made for them, even in the expression of the most general laws of nature. But in any case, every question about your body is a question about the physical laws of matter, and about nothing else. To say: 'Up to this point science can explain; here the soul steps in,' is not to say what is untrue, but to talk nonsense. If evidence were found that the matter constituting the brain behaved other-

wise than ordinary matter, or if it were impossible to describe vital actions as particular examples of general physical rules, this would be a fact in physics, a fact relating to the motion of matter; and it must either be explained by further elaboration of physical science or else our conception of the objective order of our feelings would have to be changed. The question, 'Is the mind a force?' is condemned by similar considerations. A certain variable quality of matter (the rate of change of its motion) is found to be invariably connected with the position relatively to it of other matter; considered as expressed in terms of this position, the quality is called Force. Force is thus an abstraction relating to *objective* facts; it is a mode of grouping of my feelings, and cannot possibly be the same thing as an eject, another man's consciousness. But the question: 'Do the changes in a man's consciousness *run parallel* with the changes of motion, and therefore with the forces in his brain?' is a real question, and not *primâ facie* nonsense. Objections of like character may be raised against the language of some writers who speak of changes in consciousness as *caused* by actions on the organism. The word *Cause*, πολλαχῶς λεγόμενον and misleading as it is, having no legitimate place in science or philosophy, may yet be of some use in conversation or literature, if it is kept to denote a relation between objective facts, to describe certain parts of the phenomenal order. But only confusion can arise if it is used to express the relation between certain objective facts in my consciousness and the ejective facts which are inferred as corresponding in some way to them and running parallel with them. For all that we know at present, this relation

does not in any way resemble that expressed by the word Cause.

To sum up, the distinction between eject and object, properly grasped, forbids us to regard the eject, another man's mind, as coming into the world of objects in any way, or as standing in the relation of cause or effect to any changes in that world. I need hardly add that the facts do very strongly lead us to regard our bodies as merely complicated examples of practically universal physical rules, and their motions as determined in the same way as those of the sun and the sea. There is no evidence which amounts to a *primâ facie* case against the dynamical uniformity of Nature; and I make no exception in favour of that *slykick* force which fills existing lunatic asylums and makes private houses into new ones.

Correspondence of Elements of Mind and Brain-Action.

I have already spoken of certain ejective facts—the changes in your consciousness—as running parallel with the changes in your brain, which are objective facts. The parallelism here meant is a parallelism of complexity, an analogy of structure. A spoken sentence and the same sentence written are two utterly unlike things, but each of them consists of elements; the spoken sentence of the elementary sounds of the language, the written sentence of its alphabet. Now the relation between the spoken sentence and its elements is very nearly the same as the relation between the written sentence and its elements. There is a correspondence of element to element; although an elementary sound is quite a different thing from a letter of the alphabet,

yet each elementary sound belongs to a certain letter or letters. And the sounds being built up together to form a spoken sentence, the letters are built up together, *in nearly the same way*, to form the written sentence. The two complex products are as wholly unlike as the elements are, but the manner of their complication is the same. Or, as we should say in the mathematics, a sentence spoken is the same function of the elementary sounds as the same sentence written is of the corresponding letters.

Of such a nature is the correspondence or parallelism between mind and body. The fundamental 'deliverance' of consciousness affirms its own complexity. It seems to me impossible, as I am at present constituted, to have only one absolutely simple feeling at a time. Not only are my objective perceptions, as of a man's head or a candlestick, formed of a great number of parts ordered in a definite manner, but they are invariably accompanied by an endless string of memories, all equally complex. And those massive organic feelings with which, from their apparent want of connexion with the objective order, the notion of consciousness has been chiefly associated,—those also turn out, when attention is directed to them, to be complex things. In reading over a former page of my manuscript, for instance, I found suddenly, on reflection, that although I had been conscious of what I was reading I paid no attention to it; but had been mainly occupied in debating whether faint red lines would not be better than blue ones to write upon, in picturing the scene in the shop when I should ask for such lines to be ruled, and in reflecting on the lamentable helplessness of nine

men out of ten when you ask them to do anything slightly different from what they have been accustomed to do. This debate had been started by the observation that my handwriting varied in size according to the nature of the argument, being larger when that was diffuse and explanatory, occupied with a supposed audience; and smaller when it was close, occupied only with the sequence of propositions. Along with these trains of thought went the sensation of noises made by poultry, dogs, children, and organ-grinders; and that vague diffused feeling in the side of the face and head which means a probable toothache in an hour or two. Under these circumstances, it seems to me that consciousness must be described as a succession of groups of changes, as analogous to a rope made of a great number of occasionally interlacing strands.

This being so, it will be said that there is a unity in all this complexity, that in all these varied feelings it is I who am conscious, and that this sense of personality, the self-perception of the Ego, is one and indivisible. It seems to me (here agreeing with Hume) that the 'unity of apperception' does not exist in the instantaneous consciousness which it unites, but only in subsequent reflection upon it; and that it consists in the power of establishing a certain connexion between the memories of any two feelings which we had at the same instant. A feeling, at the instant when it *exists*, exists *an und für sich*, and not as *my* feeling; but when on reflection I remember it as my feeling, there comes up not merely a faint repetition of the feeling, but inextricably connected with it a whole set of connexions with the general stream of my consciousness. This memory,

again, *qua* memory, is relative to the past feeling which it partially recalls; but in so far as it is itself a feeling, it is absolute, *Ding-an-sich*. The feeling of personality, then, is a certain feeling of connexion between faint images of past feelings; and personality itself is the fact that such connexions are set up, the property of the stream of feelings that part of it consists of links binding together faint reproductions of previous parts. It is thus a relative thing, a mode of complication of certain elements, and a property of the complex so produced. This complex is consciousness. When a stream of feelings is so compact together that at each instant it consists of (1) new feelings, (2) fainter repetitions of previous ones, and (3) links connecting these repetitions, the stream is called a consciousness. A far more complicated grouping than is necessarily implied here is established when discrete impressions are run together into the perception of an object. The *conception* of a particular object, as object, is a group of feelings symbolic of many different perceptions, and of links between them and other feelings. The distinction between Subject and Object is twofold; first, the distinction with which we started between the subjective and objective *orders* which simultaneously exist in my feelings; and secondly, the distinction between me and the social object, which involves the distinction between me and you. Either of these distinctions is exceedingly complex and abstract, involving a highly organized experience. It is not, I think, possible to separate one from the other; for it is just the objective order which I do suppose to be common to me and to other minds.

I need not set down here the evidence which shows

that the complexity of consciousness is paralleled by complexity of action in the brain. It is only necessary to point out what appears to me to be a consequence of the discoveries of Müller and Helmholtz in regard to sensation: that at least those distinct feelings which can be remembered and examined by reflection are paralleled by changes in a portion of the brain only. In the case of sight, for example, there is a message taken from things outside to the retina, and therefrom sent in somewhither by the optic nerve; now we can tap this telegraph at any point and produce the sensation of sight, without any impression on the retina. It seems to follow that what is known *directly* is what takes place at the inner end of this nerve, or that the consciousness of sight is simultaneous and parallel in complexity with the changes in the grey matter at the internal extremity, and not with the changes in the nerve itself, or in the retina. So also a pain in a particular part of the body may be mimicked by neuralgia due to lesion of another part.

We come then, finally, to say that as your consciousness is made up of elementary feelings grouped together in various ways (ejective facts), so a part of the action in your brain is made up of more elementary actions in parts of it, grouped together *in the same ways* (objective facts). The knowledge of this correspondence is a help to the analysis of both sets of facts; but it teaches us in particular that any feeling, however apparently simple, which can be retained and examined by reflection, is already itself a most complex structure. We may, however, conclude that this correspondence extends to the elements, and that each simple feeling corres-

ponds to a special comparatively simple change of nerve-matter.

The Elementary Feeling is a Thing-in-itself.

The conclusion that elementary feeling co-exists with elementary brain-motion in the same way as consciousness co-exists with complex brain-motion involves more important consequences than might at first sight appear. We have regarded consciousness as a complex of feelings, and explained the fact that the complex is conscious as depending on the mode of complication. But does not the elementary feeling itself imply a consciousness in which alone it can exist, and of which it is a modification? Can a feeling exist by itself, without forming part of a consciousness? I shall say *no* to the first question, and *yes* to the second, and it seems to me that these answers are required by the doctrine of evolution. For if that doctrine be true, we shall have along the line of the human pedigree a series of imperceptible steps connecting inorganic matter with ourselves. To the later members of that series we must undoubtedly ascribe consciousness, although it must, of course, have been simpler than our own. But where are we to stop? In the case of organisms of a certain complexity consciousness is inferred. As we go back along the line, the complexity of the organism and of its nerve-action insensibly diminishes; and for the first part of our course we see reason to think that the complexity of consciousness insensibly diminishes also. But if we make a jump, say to the tunicate molluscs, we see no reason there to infer the existence of consciousness at all. Yet not only is it impossible to point out a place

where any sudden break takes place, but it is contrary to all the natural training of our minds to suppose a breach of continuity so great. All this imagined line of organisms is a series of objects in my consciousness; they form an insensible gradation, and yet there is a certain unknown point at which I am at liberty to infer facts *out* of my consciousness corresponding to them! There is only one way out of the difficulty, and to that we are driven. Consciousness is a complex of ejective facts,—of elementary feelings, or rather of those remoter elements which cannot even be felt, but of which the simplest feeling is built up. Such elementary ejective facts go along with the action of every organism, however simple; but it is only when the material organism has reached a certain complexity of nervous structure (not now to be specified) that the complex of ejective facts reaches that mode of complication which is called Consciousness. But as the line of ascent is unbroken, and must end at last in inorganic matter, we have no choice but to admit that every motion of matter is simultaneous with some ejective fact or event which might be part of a consciousness. From this follow two important corollaries.

1. A feeling can exist by itself, without forming part of a consciousness. It does not depend for its existence on the consciousness of which it may form a part. Hence a feeling (or an eject-element) is *Ding-an-sich*, an absolute, whose existence is not relative to anything else. *Sentitur* is all that can be said.

2. These eject-elements, which correspond to motions of matter, are connected together in their sequence and co-existence by counterparts of the physical laws of

matter. For otherwise the correspondence could not be kept up.

Mind-stuff is the reality which we perceive as Matter.

That element of which, as we have seen, even the simplest feeling is a complex, I shall call *Mind-stuff*. A moving molecule of inorganic matter does not possess mind or consciousness; but it possesses a small piece of mind-stuff. When molecules are so combined together as to form the film on the under side of a jelly-fish, the elements of mind-stuff which go along with them are so combined as to form the faint beginnings of Sentience. When the molecules are so combined as to form the brain and nervous system of a vertebrate, the corresponding elements of mind-stuff are so combined as to form some kind of consciousness; that is to say, changes in the complex which take place at the same time get so linked together that the repetition of one implies the repetition of the other. When matter takes the complex form of a living human brain, the corresponding mind-stuff takes the form of a human consciousness, having intelligence and volition.

Suppose that I see a man looking at a candlestick. Both of these are objects, or phenomena, in my mind. An *image* of the candlestick, in the optical sense, is formed upon his retina, and nerve messages go from all parts of this to form what we may call a *cerebral image* somewhere in the neighbourhood of the optic thalami in the inside of his brain. This cerebral image is a certain complex of disturbances in the matter of these organs; it is a material or physical fact, therefore a group of my possible sensations, just as the candlestick

is. The cerebral image is an imperfect representation of the candlestick, corresponding to it point for point in a certain way. Both the candlestick and the cerebral image are matter; but one material complex *represents* the other material complex in an imperfect way.

Now the candlestick is not the external reality whose existence is represented in the man's mind; for the candlestick is a mere perception in *my* mind. Nor is the cerebral image the man's perception of the candlestick; for the cerebral image is merely an idea of a possible perception in my mind. But there *is* a perception in the man's mind, which we may call the *mental image*; and this corresponds to some external reality. *The external reality bears the same relation to the mental image that the (phenomenal) candlestick bears to the cerebral image.* Now the candlestick and the cerebral image are both matter; they are made of the same stuff. Therefore the external reality is made of the same stuff as the man's perception or mental image, that is, it is made of mind-stuff. And as the cerebral image represents imperfectly the candlestick, in the same way and to the same extent the mental image represents the reality external to his consciousness. Thus in order to find the thing-in-itself which is represented by any object in my consciousness such as a candlestick, I have to solve this question in proportion, or rule of three:—

As the physical configuration of my cerebral image of the object
is to the physical configuration of the object,
so is my perception of the object (the object regarded as complex of my feelings)
to the thing-in-itself.

Hence we are obliged to identify the thing-in-itself with that complex of elementary mind-stuff which on other grounds we have seen reason to think of as going along with the material object. Or, to say the same thing in other words, the reality external to our minds which is represented in our minds as matter is in itself mind-stuff.

The universe, then, consists entirely of mind-stuff. Some of this is woven into the complex form of human minds containing imperfect representations of the mind-stuff outside them, and of themselves also, as a mirror reflects its own image in another mirror, *ad infinitum*. Such an imperfect representation is called a material universe. It is a picture in a man's mind of the real universe of mind-stuff.

The two chief points of this doctrine may be thus summed up:—

Matter is a mental picture in which mind-stuff is the thing represented.

Reason, intelligence, and volition are properties of a complex which is made up of elements themselves not rational, not intelligent, not conscious.

Note. The doctrine here expounded appears to have been arrived at independently by many persons; as was natural, seeing that it is (or seems to me) a necessary consequence of recent advances in the theory of perception. Kant [1] threw out a suggestion that the *Ding an sich* might be of the nature of mind; but the first statement of the doctrine in its true connexion that I know

[1] ['Kritik der reinen Vernunft,' pp. 287–8, ed. Rosenkranz. Wundt's statement is in the concluding paragraphs of 'Grundzüge der physiologischen Psychologie.' Compare too Häckel, 'Zellseelen and Seelenzellen,' in 'Deutsche Rundschau,' July, 1878, vol. xvi. p. 40.]

of is by Wundt. Since it dawned on me, some time ago, I have supposed myself to find it more or less plainly hinted in many writings; but the question is one in which it is peculiarly difficult to make out precisely what another man means, and even what one means one's self.

Some writers (*e.g.* Dr. Tyndall) have used the word *matter* to mean the phenomenon *plus* the reality represented; and there are many reasons in favour of such usage in general. But for the purposes of the present discussion I have thought it clearer to use the word for the phenomenon as distinguished from the thing-in-itself.

ON THE TYPES OF COMPOUND STATEMENT INVOLVING FOUR CLASSES.

PROFESSOR STANLEY JEVONS has enumerated[1] the types of compound statement involving three classes, among which the premises of a syllogism appear as a type of fourfold statement. He propounded at the same time the corresponding problem of enumeration for four classes, which is solved in the present communication. The reader is referred to the paper or the book just mentioned for further explanation of the nature and purpose of the problem than is to be found in art. 1. It may, however, be premised that the letters A, B, C, D denote four *classes* or *terms* (for example, hard, wet, black, nice), and that, according to a convenient notation of De Morgan's, the small letters a, b, c, d denote the complementary classes or contrary terms (not hard, not wet, not black, not nice). A *simple* statement is of the form $ABCD=0$ (no hard, wet, black, nice things exist or

[1] 'Proceedings of the Manchester Philosophical Society,' vol. vi. pp. 65–68, and 'Memoirs,' Third series, vol. v. pp. 119–130. 'The Principles of Science,' vol. i. pp. 154–164. [1st ed. Prof. Jevons there said, p. 163: 'Some years of continuous labour would be required to ascertain the precise number of types of laws which may govern the combinations of only four things.' In the second edition, p. 143, he says: 'Though I still believe that some years' labour would be required to work out the types themselves, it is clearly a mistake to suppose that the *numbers* of such types cannot be calculated with a reasonable amount of labour, Professor W. K. Clifford having actually accomplished the task.' A short statement of the results of the present paper is then given.]

which is the same thing, all hard, wet, black things are nasty). The statement ABC=0 (no hard, wet, black things exist, or all hard, black things are dry) is to be regarded as made of these two, ABCD=0, ABCd=0 (no hard, wet, black, nice things exist, and no hard, wet, black, nasty things exist) and so is called a *compound* (in this case a *twofold*) statement. The notion of types is defined in art. 1.

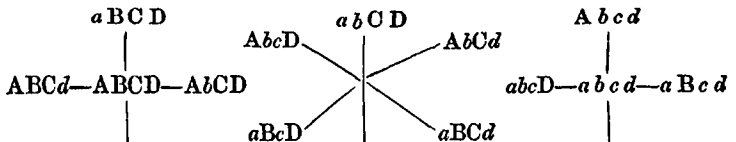
1. Four classes or terms A, B, C, D, give rise to sixteen cross divisions or *marks* such as AbCd. A denial of the existence of one of these cross divisions, or of anything having its mark (such as AbCd=0), is called a simple statement. A denial of two or more cross divisions is called a compound statement, and moreover, twofold, threefold, etc., according to the number denied.

When two compound statements can be converted into one another by interchange of the classes A, B, C, D, with each other or with their complementary classes a, b, c, d, they are called *similar*; and all similar statements are said to belong to the same *type*. The problem before us is to enumerate all the types of compound statement that can be made with four terms.

2. Two statements are called *complementary* when they deny between them all the sixteen marks without both denying any mark, or, which is the same thing, when each denies just those marks which the other permits to exist. It is obvious that when two statements are similar, the complementary statements will also be similar; and, consequently, for every type of n-fold statement there is a *complementary type* of $\overline{16-n}$-fold statement. It follows that we need only enumerate the

types as far as the eighth order; for the types of more than eightfold statement will already have been given as complementary to types of lower orders. Every eightfold statement is complementary to an eightfold statement; but these are not necessarily of the same type.

3. One mark A B C D may be converted into another A*b*C*d* by interchanging one or more of the classes A, B, C, D with its complementary class. The number of such changes is called the *distances* of the two marks. Thus in the example given the distance is 2. In two similar compound statements the distances of the marks denied must be the same; but it does not follow that when all the distances are the same the two statements are similar. There is, however, as we shall see, only one example of two dissimilar statements having the same distances. When the distance is 4, the two marks are said to be *obverse* to one another, and the statements denying them are called *obverse* statements—as A B C D, *abcd*, or, again, A*b*C*d*, or, again, A*b*C*d*, *a*B*c*D. When any one mark is given (called the *origin*), all the others may be grouped in respect of their relations to it as follows:—Four are at distance *one* from it, and may be called *proximates*; six at distance *two*, and may be called *mediates*; four at distance *three*, and may be called *ultimates*. Finally, the obverse is at distance *four*.



It will be seen from the above table that the four proxi-

mates are respectively obverse to the four ultimates, and that the mediates form three pairs of obverses. Every proximate or ultimate is distant 1 and 3 respectively from such a pair of mediates. Thus each proximate or ultimate divides the mediates into two classes; three of them are at distance 1 from it, and three at distance 3. Two mediates which are not obverse are at distance 2. Two proximates or two ultimates, or an ultimate and a proximate which are not obverse, are also at distance 2.

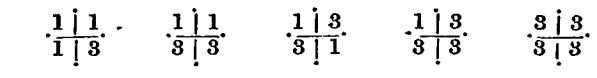
This view of the mutual relations of the marks is the basis of the following enumeration of types.

4. There is clearly only one type of simple statement. But of twofold statements there are four types; viz. the distance may be 1, 2, 3, or 4; and so, in general, with n classes there are n types of twofold statement.

5. A compound statement containing no pair of obverses is called *pure*. In a threefold statement there are three distances; one of these must be not less than either of the others. If this be 2, the remaining mark must be at odd distance from both of these or at even distance from both; thus we get the types 1, 1, 2, and 2, 2, 2. If the not-less distance be 3, the remaining distances must be one even and the other odd; the even distance must be 2, the odd one either 1 or 3; and the types are 1, 2, 3; 2, 3, 3. Thus there are 4 pure threefold types. With a pair of obverses, the remaining mark must be at odd or even distance from them; 1, 3, 4; 2, 2, 4. In all six threefold types observe that there is necessarily one even distance.

6. *A fortiori*, in a fourfold statement there must be one even distance. In a pure fourfold statement this distance is 2. From this pair of marks let both the

others be oddly distant; then they must be evenly distant from one another *i.e.* at distance 2, obverses being excluded. The odd distances are 1 or 3; and it will be easily seen that the following are all the possible cases :—



In these figures the dots indicate the four marks, the cross lines indicate distance 2, and the other figures the distances between the marks on either side of them. Next, from the pairs of marks at distance 2 let one of the others at least be evenly distant, *i.e.* at distance 2. Then we have three marks which are all at distance 2 from one another; and it is easy to show that they are all proximates of a certain other mark. For, select one of them as origin; then the other two are mediates which are not obverse, and which consequently are at distance 1, from some one proximate. With this proximate as origin, therefore, all three are proximates. We have therefore only to inquire what different relations the fourth mark can bear to these three. It may be the origin, its obverse, the remaining proximate, its obverse, or one of two kinds of mediates, viz. at distance 1 or 3 from the remaining proximate. Thus we have 6 types, in which the distances of the fourth mark from the triad are respectively 1 1 1, 3 3 3, 2 2 2, 2 2 2, 1 3 3, 1 1 3. The third and fourth of these are especially interesting, as being distinct types with the same set of distances; I call them *proper* and *improper groups* respectively: viz., a proper group is the four proximates of any origin; an improper group is three proximates with the obverse of

the fourth. On the whole we get 12 types of pure fourfold statement.

7. In a fourfold statement with *one* pair of obverses, take one of them for origin; the remaining two marks must then be either a pair of proximates or ultimates, a proximate and an ultimate, a pair of mediates, or a proximate or ultimate, with one of two kinds of mediate —in all, 5 types, with the distances $1\,3^2$, $1\,3$; $1\,3^2$, $3\,1$; $2\,2^2$, $2\,2$; $1\,3^1$, $2\,2$; $1\,3^3$, $2\,2$. With *two* pairs of obverses they must be either at odd or even distances from one another; two types. Altogether $12+5+2=19$ fourfold types.

8. In a *pure* fivefold statement there is always a triad of marks at distance 2 from one another. For there is a pair evenly distant; if there is not another mark evenly distant from these, the remaining three are all oddly distant, and therefore evenly distant from one another. First, then, let the remaining two marks be both oddly distant from the triad. In regard to the origin of which these are proximates, the two to be added must be either two mediates, like (of two kinds) or unlike, or a mediate of either kind with the origin or the obverse; 7 types. Next, if one of the two marks be evenly distant from the triad, it must form with the triad either a proper or an improper group of four. To a proper group we may add the origin, the obverse, or a mediate; to an improper group, the origin or the obverse (the mediates give no new type), 5 types; or, in all, 12 pure fivefold types.

9. In a fivefold statement with one pair of obverses there must be another pair of marks at distance 2. We have therefore to add one mark to each of the following

three types of fourfold statement,—a pair of obverses together with (1) two proximates, (2) a proximate and an ultimate, (3) two mediates. To the first we may add another proximate, an ultimate or a mediate of three kinds, viz. at distances 1 1, 1 3, 3 3 from the two proximates; 5 types. To the second if we add a proximate or an ultimate, we fall back on one of the previous cases; but there are again three kinds of mediates, at distances 1 1, 3 3, 1 3 from the proximate and ultimate; 3 types. To the third we may add another mediate, whereby the type becomes a proper group together with the obverse of one of its marks, which is the same thing as an improper group together with the obverse of one of its marks—or a proximate or ultimate which are of three kinds, at distances 1 1, 1 3, 3 3 from the two mediates; 4 types. Thus there are 12 fivefold types with one pair of obverses. With two pair of obverses at odd distances, there is only one type, all the remaining marks being similarly related to them; at even distance the remaining mark may be evenly or oddly distant from them; 2 types. On the whole we have $12+12+3=27$ types of fivefold statement.

It is to be remarked that there is no pure fivefold statement in which all the distances are even, and that, if there is only one pair of obverses with all the distances even, the type is a proper group together with the obverse of one of its marks.

10. We may now prove, as a consequence of the last remark, that a pure sixfold statement either contains a group of four with a pair oddly distant from it, or consists of two triads oddly distant from one another.

For there must be a pair at distance 2: if the other four are all oddly distant from these, they form a group; if one is evenly distant, and three oddly distant, we have the case of the two triads; if two are evenly distant, we again have a group. We must add, then, first to a proper group, and then to an improper group, a pair oddly distant from it. To a proper group consisting of the proximates to a certain origin we may add the origin or its obverse with a mediate, or two mediates; 3 types. An improper group is symmetrical; that is to say, if we substitute for any one of its marks the obverse of that mark, we shall obtain a proper group. In this way we shall get four origins distant 1 1 1 3 from the group, and four obverses distant 1 3 3 3; if we add to these the obverses of the marks in the group itself, we have described the relation of the twelve remaining marks to the group. To form, therefore, a pure sixfold statement we may add either two origins or two obverses or an origin and an obverse; 3 types.

In the case of the two triads, since they are oddly distant from one another their origins must be oddly distant; that is, they must be distant either 1 or 3. If they are distant 1, neither, both, or one of the origins may appear in the statement; if they are distant 3, neither, both, or one of the obverses: 6 types. Thus we obtain 12 types of purely sixfold statement.

11. If a sixfold statement contains one pair of obverses, the remaining four marks cannot all be evenly distant from this pair. For in that case they would constitute a group; and it is easy to see that the marks evenly distant from a group, whether proper or improper,

do not contain a pair of obverses. We have therefore only these four cases to consider :—

(1) The four marks are all oddly distant from the obverses.

(2) One is evenly distant and three oddly distant.

(3) Two are evenly distant and two oddly.

(4) Three are evenly distant and one oddly.

In the first case the four marks form a group. If this is a proper group, the pair of obverses must be either the origin and obverse of the group, or a pair of mediates; 2 types. If the group is improper, the pair must be an origin and an obverse; 1 type. In the second case we have an origin, an obverse, and a mediate, to which we must add 3 marks taken out of the proximates and ultimates. We may add 3 proximates distant respectively 1 1 3 or 1 3 3 from the mediates (2 types),—or 2 proximates distant respectively 1 1, 1 3, 3 3 from the mediate, and with each of these combinations an ultimate distant either 1 or 3 (6 types). To interchange proximates with ultimates clearly makes no difference; so that in reckoning the cases of 1 proximate and 2 ultimates or 3 ultimates, we should find no new types. In the third case we have an origin, an obverse, and two mediates distant 2 from each other; and to these we have to add either two proximates or a proximate and an ultimate. The two proximates may be distant from the two mediates 1 1, 1 3, or 1 1, 3 3, or 1 3, 1 3, or 1 3, 3 3; 4 types. The proximate or ultimate must not be respectively distant 1 1, 3 3, or 3 3, 1 1; for then they would form a pair of obverses; there remain the cases 1 1 with 1 1 or 1 3, 1 3 with 1 3, and 3 3 with 1 3 or 3 3; 5 types. In the fourth case we have

an origin, obverse, and three mediates distant 2 from another; the remaining mark must be distant either 1 or 3 from these mediates; 2 types. This makes twenty-two types of sixfold statement with one pair of obverses.

12. If a sixfold statement contains two pairs of obverses, these must be either evenly or oddly distant. If they are evenly distant we have an origin, obverse, and two obverse mediates, to which two other marks are to be added. These may be both evenly distant; taking one of them as origin, it is associated with 5 mediates, so that there is 1 type only. Or both oddly distant; here there are two cases, according as the distances are 1 1, 3 3, or 1 3, 1 3. Or one oddly and one evenly distant; the latter is any one of the four remaining mediates, and then the former is distant 1 or 3 from it; 2 types. If the two pairs of obverses be oddly distant they form an aggregate which is related in the same way to all the remaining twelve marks; viz. any one of these being taken as origin, we have a pair of mediates and a proximate with its obverse ultimate. The thing to be considered, therefore, is the distance between the two marks to be added, which may be 1, 2, or 3, and each in two ways; 6 types.

A sixfold statement with three pairs of obverses is one of two types only; viz. these are all evenly distant when they are the mediates to one origin, or two evenly distant and one oddly distant from both of them.

13. A pure sevenfold statement must consist of a group and a triad; for it must contain a triad, by the same reasoning by which this was proved for a fivefold

statement; and then either all the other four marks are oddly distant from this, and so form a group by themselves, or else one of them is evenly distant from the triad and so forms a group with it. If the group is proper, being the proximates to a certain origin, the triad must consist of two mediates and either the origin, the obverse, or another mediate; and in the latter case the three mediates are distant 1 1 1 or 3 3 3 from some proximate; 4 types. If the group is improper, the triad is either all origins or all obverses, or two origins and an obverse, or an origin and two obverses; 4 types. In all, 8 types of pure sevenfold statement.

14. A sevenfold statement with one pair of obverses must consist either of four marks evenly distant from one another and three oddly distant from them; or of five marks evenly distant from one another and two oddly distant from them. In the former case the pair of obverses may be in the four or in the three. If they are in the four, the three form a triad which are proximates to one origin; and then the pair may be the origin and obverse or a pair of mediates. If the pair are origin and obverse, the other two (at distance 2) are mediates, distance 1 1, 1 3 or 3 3 from the proximate which is not in the triad; if the pair are mediates, the two may be the origin or obverse with a mediate distant 1 or 3 from that proximate (4 types), or two mediate distant 1 1, 1 3, 3 3 from it (3 types). If the pair of obverses are in the set of three marks, the four form a group, which may be proper or improper. If proper, the three may be origin and obverse with a mediate, or a pair of mediates with origin, obverse, or another mediate; 4 types. If improper, the three must be two

origins and an obverse, or an origin and two obverses; 3 types.

Five marks evenly distant containing only one pair of obverses, must be a proper group with the obverse of one of its marks; see end of art 9. To these we may add the origin or obverse of the proper group with a mediate distant 1 or 3 from the extra mark, or else two mediates distant 1 1, 1 3, or 3 3 from that mark; 7 types.

15. A sevenfold statement with two pairs of obverses may have six marks evenly distant from one another and one oddly distant from them; in this case the six are an origin and five mediates in two different ways, or say two pairs and a two; the remaining mark may be distant 1 1, 1 3, or 3 3 from the two, which gives 3 types.

Otherwise the sevenfold statement must subdivide (as in the last case) into five and two or into four and three. If it subdivide into five and two, the two may be a pair or not. In the first case we have a proper group and the obverse of one of its marks, together with the origin and obverse of the group or a pair of mediates; 2 types. In the second case we have five mediates of an origin or its obverse, to which we may add two proximates distant 1 1, 1 3 or 3 3 from the old mediate, or a proximate and an ultimate distant 1 1, 1 3 or 3 3 respectively from the odd mediate; 6 types.

If the sevenfold statement subdivide into four and three, the two pairs may be both in the four, or one in the four and one in the three. In the former case we have a triad, to which may be added the origin and obverse and a pair of mediates or two pairs of mediates; 2

types. In the latter case the four consists of an origin and obverse and two mediates; we must add a pair consisting of a proximate and an ultimate, which may be distant 1 1, 3 3 or 1 3, 1 3 from the two mediates, and then another proximate or ultimate which may be distant 1 1, 1 3, or 3 3 from the two mediates; 6 types.

16. Three pairs of obverses in a sevenfold statement may be all evenly distant, or two evenly and the other pair oddly distant from each. If they are all evenly distant they are the mediates to a certain origin or its obverse, and the seventh mark may be the origin or a proximate, 2 types. In the other case we have an origin, obverse, and pair of mediates together with a proximate and its obverse ultimate; we may add a proximate or a mediate, 2 types.

17. A pure eightfold statement must consist of two groups, either both proper or both improper, or one of each. Two proper groups may have their origins distant 1 or 3; 2 types. To an improper group we may add a proper group made of one origin and three obverses or of three origins and one obverse, or an improper group made of four origins or four obverses or two origins and two obverses; 5 types. Altogether there are 7 types of pure eightfold statement.

18. An eightfold statement with one pair of obverses must subdivide into four and four, or into five and three. In the former case we have a pair of obverses, viz. an origin and its obverse, and two mediates; to which we must add a group formed out of the proximates and ultimates. This group may be proper, (1 type), or improper, the mediates being in regard to it two origins, two obverses, or an origin and an obverse;

3 types. In the latter case the five marks must be a proper group with the obverse of one mark, to which we must add a triad made out of the origin, obverse, and mediates of the group. This triad may be the origin or obverse together with two mediates distant 1 1, 1 3, 3 3 from the ultimate, 6 types; or else it may be three mediates distant 1 1 1, 1 1 3, 1 3 3, 3 3 3 from the ultimate, 4 types.

19. An eightfold statement with two pairs of obverses must subdivide into four and four, or into five and three, or into six and two. In the first case the two pairs of obverses may be evenly distant, when the remaining marks form a group either proper, with its origin, obverse, and pair of mediates, or two pairs of mediates, or else improper, 3 types; or oddly distant, when the remainder form one of the six pure fourfold statements enumerated art. 6. Two marks distant 2 from each other may be distant 1 1, 3 3 or 1 3, 1 3 from the pair of obverses which are oddly distant from them; thus each of the six fourfold statements gives 3 types of eightfold statement, except the third, which gives 4; in all 19. In the second case the three may be a triad or may contain a pair of obverses. If it is a triad, the five are mediates to one origin and its obverse, and we add three proximates distant 1 1 3 or 1 3 3 or two proximates distant 1 1, 1 3 or 3 3, with an ultimate distance respectively 1 1 or 3 3 from the old mediate; 6 types. If the three contain a pair of obverses, the five make a proper group with obverse of one mark; to this we may add the origin and obverse of the group with mediate distant 1 or 3 from the ultimate, or a pair of

obverse mediates with a mediate distant 1 or 3 as before; 4 types. In the third case the six must be an origin and five mediates, and we may add two proximates distant 1 1, 1 3, 3 3 from the old mediate, or a proximate and an ultimate, or two ultimates, distant as before; 9 types.

20. In an eightfold statement with three pairs of obverses these may be either all evenly distant, or two of them evenly distant and the other oddly distant from both. In the first case they are mediates to a certain origin and its obverse, and we may add the origin with a proximate or ultimate, two proximates, or a proximate and ultimate; 4 types. In the second case take the oddly distant pair for origin and obverse; then these are associated with two proximates and their obverse ultimates, and we may add the two other proximates, a proximate and an ultimate, a proximate and a mediate (distant 1 1, 1 3, 3 1, 3 3 from this proximate and the remaining one), or two mediates distant 1 1, 3 3 or 1 3, 1 3 from the two proximates; 8 types.

Lastly, in an eightfold statement with four pairs of obverses they may be all evenly distant, or the statement may subdivide into six and two, or into four and four; in the latter case there are 2 types.

21. To obtain the whole number of types, we observe that for every less-than-eightfold type there is a complementary more-than-eightfold type (art. 2); so that we must add the number of eightfold types (78) to twice the number of less-than-eightfold types (159); the result is 396.

TABLE.

Art.				
4.	1-fold			1
	2-fold, distance 1, 2, 3, 4			4
5.	3-fold, pure, distance 1 1 2, 2 2 2, 1 2 3, 2 3 3 . . .		4	
	1 pair obv., dist. 1 3 4, 2 2 4		2	
			6	6
6.	4-fold, pure, two and two :—			
	$\frac{1}{1}\frac{1}{1}$ $\frac{1}{1}\frac{1}{3}$ $\frac{1}{3}\frac{1}{3}$ $\frac{1}{3}\frac{3}{1}$ $\frac{1}{3}\frac{3}{3}$ $\frac{3}{3}\frac{3}{3}$	6		
	three and one	4		
	group, proper or improper . . .	2		
		12	12	
7.	„ 1 pair obv.		5	
	2 pair obv., dist. odd or even		2	
			19	19
8.	5-fold, pure, three and two	7		
	four and one	5		
			12	
9.	„ 1 pair obv. + two prox. . . .	5		
	+ prox. + ult. . . .	3		
	+ two med.	4		
		12		
			12	
	2 pair obv., odd dist., 1 ; even, 2		3	
			27	27
10.	6-fold, pure, three and three	6		
	four and two	6		
		12		
			12	
11.	„ 1 pair obv., two and four . . .	3		
	three and three . . .	8		
	four and two . . .	9		
	five and one	2		
		22		
			22	
12.	„ 2 pair obv., odd dist., 6 ; even, 5		11	
	3 pair obv.		2	
			47	47

Art.					
13.	7-fold, pure; proper group, 4; improper, 4			8	
14.	„ 1 pair obv., four and three	10			
	three and four	7			
	five and two	7			
		24			
				24	
15.	„ 2 pair obv., six and one	8			
	five and two	8			
	four and three	8			
		19			
				19	
16.	„ 3 pair obv.			4	
				55	55
	Total of less-than-eightfold statements				159
	Complementary more-than-eightfold statements				159
17.	8-fold, pure			7	
18.	„ 1 pair obv., four and four	4			
	five and three	10			
		14		14	
19.	„ 2 pair obv., four and four	22			
	five and three	10			
	six and two	9			
		41		41	
20.	8-fold, 3 pair obv., all evenly dist.	4			
	two evenly dist.	8			
		12		12	
	4 pair obv.			4	
				78	78
	Grand Total				396

ON THE SCIENTIFIC BASIS OF MORALS.[1]

The crude essay which here follows is allowed to see the light rather as a text for the remarks to which it has given rise than for its own sake. It was written as a means of seeking for more light, and in that respect has succeeded. Some remarks of Mr. Darwin's ('Descent of Man,' part i. ch. 3) appeared to me to constitute a method of dealing with ethical problems bearing a close analogy to the methods which have been successful in all other practical questions, but differing somewhat in principle from the theories which are at present in vogue, while in its results it coincides with the highest and healthiest practical instincts of this and of all times. All that is attempted here is, to show roughly what account is given by this method of some of the fundamental conceptions—right and wrong, conscience, responsibility—and to indicate the nature of the standard which must guide their application. Exact definitions are not to be looked for; they come as the last product of a completed theory, and are sure to be wrong at an early stage of science. But though we may be unable to define fully what right is, we do, I think, arrive at principles which show us very clearly many things which it is not; and these conclusions are not only of great practical importance, but theoretically bear close analogy to the steps by which complete definition has been attained in the exact sciences.

By Morals or Ethic I mean the doctrine of a special kind of pleasure or displeasure which is felt by the human mind in contemplating certain courses of conduct, whereby they are felt to be *right* or *wrong*, and of a special desire to do the right things and avoid the wrong ones. The pleasure or displeasure is commonly called the moral sense; the corresponding desire might be called the moral appetite. These are facts, existing in the consciousness of every man who need considered in this discussion, and sufficiently marked out by these names; they need no further definition. In the same

[1] 'Contemporary Review,' September, 1875.

way the sense of taste is a feeling of pleasure or displeasure in things savoury or unsavoury, and is associated with a desire for the one and a repulsion from the other. We must assume that everybody knows what these words mean; the feelings they describe may be analysed or accounted for, but they cannot be more exactly defined as feelings.

The maxims of ethic are recommendations or commands of the form, 'Do this particular thing because it is right,' or 'Avoid this particular thing because it is wrong.' They express the immediate desire to do the right thing for itself, not for the sake of anything else: on this account the mood of them is called the categorical imperative. The particular things commanded or forbidden by such maxims depend upon the character of the individual in whose mind they arise. There is a certain general agreement in the ethical code of persons belonging to the same race at a given time, but considerable variations in different races and times. To the question 'What is right?' can therefore only be answered in the first instance, 'That which pleases your moral sense.' But it may be further asked 'What is generally thought right?' and the reply will specify the ethic of a particular race and period. But the ethical code of an individual, like the standard of taste, may be modified by habit and education; and accordingly the question may be asked, 'How shall I order my moral desires so as to be able to satisfy them most completely and continuously? What *ought* I to feel to be right?' The answer to this question must be sought in the study of the conditions under which the moral sense was produced and is preserved; in other words, in the study of

its functions as a property of the human organism. The maxims derived from this study may be called maxims of abstract or absolute right; they are not absolutely universal, 'eternal and immutable,' but they are independent of the individual, and practically universal for the present condition of the human species.

I mean by Science the application of experience to new circumstances, by the aid of an order of nature which has been observed in the past, and on the assumption that such order will continue in the future. The simplest use of experience as a guide to action is probably not even conscious; it is the association by continually-repeated selection of certain actions with certain circumstances, as in the unconsciously-acquired craft of the maker of flint implements. I still call this science, although it is only a beginning; because the physiological process is a type of what takes place in all later stages. The next step may be expressed in the form of a hypothetical maxim,—'If you want to make brass, melt your copper along with this blue stone.' To a maxim of this sort it may always be replied, 'I do not want to make brass, and so I shall not do as you tell me.' This reply is anticipated in the final form of science, when it is expressed as a statement or proposition: brass is an alloy of copper and zinc, and calamine is zinc carbonate. Belief in a general statement is an artifice of our mental constitution, whereby infinitely various sensations and groups of sensations are brought into connexion with infinitely various actions and groups of actions. On the phenomenal side there corresponds a certain cerebral structure by which various combinations of disturbances in the sensor tract are made to lead to the appropriate

combinations of disturbances in the motor tract. The important point is that science, though apparently transformed into pure knowledge, has yet never lost its character of being a *craft*; and that it is not the knowledge itself which can rightly be called science, but a special way of getting and of using knowledge. Namely, science is the getting of knowledge from experience on the assumption of uniformity in nature, and the use of such knowledge to guide the actions of men. And the most abstract statements or propositions in science are to be regarded as bundles of hypothetical maxims packed into a portable shape and size. Every scientific fact is a shorthand expression for a vast number of practical directions: if you want so-and-so, do so-and-so.

If with this meaning of the word 'Science,' there is such a thing as a scientific basis of Morals, it must be true that,—

1, The maxims of Ethic are hypothetical maxims

2, Derived from experience

3, On the assumption of uniformity in nature.

These propositions I shall now endeavour to prove; and in conclusion, I shall indicate the direction in which we may look for those general statements of fact whose organization will complete the likeness of ethical and physical science.

The Tribal Self.[1]

In the metaphysical sense, the word 'self' is taken to mean the conscious subject, *das Ich*, the whole

[1] This conception of an Extended Self I found many years ago that I had in common with my friend Mr. Macmillan. Since then I have heard and read in many places expressions of it more or less distinct.

stream of feelings which make up a consciousness regarded as bound together by association and memory. But, in the more common and more restricted ethical sense, what we call *self* is a selected aggregate of feelings and of objects related to them which hangs together as a conception by virtue of long and repeated association. My self does not include all my feelings, because I habitually separate off some of them, say they do not properly belong to me, and treat them as my enemies. On the other hand, it does in general include my body regarded as an object, because of the feelings which occur simultaneously with events which affect it. My foot is certainly part of myself, because I get hurt when anybody treads on it. When we desire anything for its somewhat remote consequences, it is not common for these to be represented to the mind in the form of the actual feelings of pleasure which are ultimately to flow from the satisfaction of the desire; instead of this, they are replaced by a symbolic conception which represents the thing desired as doing good to the complex abstraction *self*. This abstraction serves thus to support and hold together those complex and remote motives which make up by far the greater part of the life of the intelligent races. When a thing is desired for no immediate pleasure that it can bring, it is generally desired on account of a certain symbolic substitute for pleasure, the feeling that this thing is suitable to the self. And, as in many like cases, this feeling, which at first derived its pleasurable nature from the faintly represented simple pleasures of which it was a symbol, ceases after a time to recall them and becomes a simple pleasure itself. In this

way the self becomes a sort of centre about which our remoter motives revolve, and to which they always have regard; in virtue of which, moreover, they become immediate and simple, from having been complex and remote.

If we consider now the simpler races of mankind, we shall find not only that immediate desires play a far larger part in their lives, and so that the conception of self is less used and less developed, but also that it is less definite and more wide. The savage is not only hurt when anybody treads on his foot, but when anybody treads on his tribe. He may lose his hut, and his wife, and his opportunities of getting food. In this way the tribe becomes naturally included in that conception of self which renders remote desires possible by making them immediate. The actual pains or pleasures which come from the woe or weal of the tribe, and which were the source of this conception, drop out of consciousness and are remembered no more; the symbol which has replaced them becomes a centre and goal of immediate desires, powerful enough in many cases to override the strongest suggestions of individual pleasure or pain.

Here a helping cause comes in. The tribe, *qua* tribe, has to exist, and it can only exist by aid of such an organic artifice as the conception of the tribal self in the minds of its members. Hence the natural selection of those races in which this conception is the most powerful and most habitually predominant as a motive over immediate desires. To such an extent has this proceeded that we may fairly doubt whether the selfhood of the tribe is not earlier in point of development

than that of the individual. In the process of time it becomes a matter of hereditary transmission, and is thus fixed as a specific character in the constitution of social man. With the settlement of countries, and the aggregation of tribes into nations, it takes a wider and more abstract form; and in the highest natures the tribal self is incarnate in nothing less than humanity. Short of these heights, it places itself in the family and in the city. I shall call that quality or disposition of man which consists in the supremacy of the family or tribal self as a mark of reference for motives by its old name *Piety*. And I have now to consider certain feelings and conceptions to which the existence of piety must necessarily give rise.

Before going further, however, it will be advisable to fix as precisely as may be the sense of the words just used. Self, then, in the ethical sense, is a conception in the mind of the individual which serves as a peg on which remote desires are hung and by which they are rendered immediate. The individual self is such a peg for the hanging of remote desires which affect the individual only. The tribal self is a conception in the mind of the individual which serves as a peg on which those remote desires are hung which were implanted in him by the need of the tribe as a tribe. We must carefully distinguish the tribal self from society, or the 'common consciousness;' it is something in the mind of each individual man which binds together his gregarious instincts.

The word *tribe* is here used to mean a group of that size which in the circumstances considered is selected for survival or destruction *as a group*. Self-regarding

excellences are brought out by the natural selection of individuals; the tribal self is developed by the natural selection of groups. The size of the groups must vary at different times; and the extent of the tribal self must vary accordingly.

Approbation and Conscience.

The tribe has to exist. Such tribes as saw no necessity for it have ceased to live. To exist, it must encourage piety; and there is a method which lies ready to hand.

We do not like a man whose character is such that we may reasonably expect injuries from him. This dislike of a man on account of his character is a more complex feeling than the mere dislike of separate injuries. A cat likes your hand, and your lap, and the food you give her; but I do not think she has any conception of *you*.[1] A dog, however, may like *you* even when you thrash him, though he does not like the thrashing. Now such likes and dislikes may be felt by the tribal self. If a man does anything generally regarded as good for the tribe, my tribal self may say, in the first place, 'I like that thing that you have done.' By such common approbation of individual acts the influence of piety as a motive becomes defined; and natural selection will in the long run preserve those tribes which have approved the right things; namely, those things which at that time gave the tribe an advantage in the struggle for existence. But in the second place, a man may as a rule and constantly, being actuated by piety, do good things for the tribe;

[1] Present company always excepted: I fully believe in the personal and disinterested affection of *my* cat.

and in that case the tribal self will say, I like *you*. The feeling expressed by this statement on the part of any individual, 'In the name of the tribe, I like you,' is what I call *approbation*. It is the feeling produced in pious individuals by that sort of character which seems to them beneficial to the community.

Now suppose that a man has done something obviously harmful to the community. Either some immediate desire, or his individual self, has for once proved stronger than the tribal self. When the tribal self wakes up, the man says, 'In the name of the tribe, I do not like this thing that I, as an individual, have done.' This Self-judgment in the name of the tribe is called Conscience. If the man goes further and draws from this act and others an inference about his own character, he may say, 'In the name of the tribe, I do not like my individual self.' This is remorse. Mr. Darwin has well pointed out that immediate desires are in general strong but of short duration, and cannot be adequately represented to the mind after they have passed; while the social forces, though less violent, have a steady and continuous action.

In a mind sufficiently developed to distinguish the individual from the tribal self, conscience is thus a necessary result of the existence of piety; it is ready to hand as a means for its increase. But to account for the existence of piety and conscience in the elemental form which we have hitherto considered is by no means to account for the present moral nature of man. We shall be led many steps in that direction if we consider the way in which society has used these feelings of the individual as a means for its own preservation.

Right and Responsibility.

A like or a dislike is one thing; the expression of it is another. It is attached to the feeling by links of association; and when this association has been selectively modified by experience, whether consciously or unconsciously, the expression serves a *purpose* of retaining or repeating the thing liked, and of removing the thing disliked. Such a purpose is served by the expression of tribal approbation or disapprobation, however little it may be the conscious end of such expression to any individual. It is necessary to the tribe that the pious character should be encouraged and preserved, the impious character discouraged and removed. The process is of two kinds; direct and reflex. In the direct process the tribal dislike of the offender is precisely similar to the dislike of a noxious beast; and it expresses itself in his speedy removal. But in the reflex process we find the first trace of that singular and wonderful judgment by analogy which ascribes to other men a consciousness similar to our own. If the process were a conscious one, it might perhaps be described in this way: the tribal self says, 'Put yourself in this man's place; he also is pious, but he has offended, and that proves that he is not pious enough. Still, he has some conscience, and the expression of your tribal dislike to his character, awakening his conscience, will tend to change him and make him more pious.' But the process is not a conscious one: the social craft or art of living together is learned by the tribe and not by the individual, and the purpose of improving men's characters is provided for by complex social arrange-

ments long before it has been conceived by any conscious mind. The tribal self learns to approve certain expressions of tribal liking or disliking; the actions whose open approval is liked by the tribal self are called right actions, and those whose open disapproval is liked are called wrong actions. The corresponding characters are called good or bad, virtuous or vicious.

This introduces a further complication into the conscience. Self-judgment in the name of the tribe becomes associated with very definite and material judgment by the tribe itself. On the one hand, this undoubtedly strengthens the motive-power of conscience in an enormous degree. On the other hand, it tends to guide the decisions of conscience; and since the expression of public approval or disapproval is made in general by means of some organized machinery of government, it becomes possible for conscience to be knowingly directed by the wise or misdirected by the wicked, instead of being driven along the right path by the slow selective process of experience. Now right actions are not those which are publicly approved, but those whose public approbation a well-instructed tribal self would like. Still, it is impossible to avoid the guiding influence of expressed approbation on the great mass of the people; and in those cases where the machinery of government is approximately a means of expressing the true public conscience, that influence becomes a most powerful help to improvement.

Let us note now the very important difference between the direct and the reflex process. To clear a man away as a noxious beast, and to punish him for

doing wrong, these are two very different things. The purpose in the first case is merely to get rid of a nuisance; the purpose in the second case is to improve the character either of the man himself or of those who will observe this public expression of disapprobation. The offence of which the man has been guilty leads to an inference about his character, and it is supposed that the community may contain other persons whose characters are similar to his, or tend to become so. It has been found that the expression of public disapprobation tends to awake the conscience of such people and to improve their characters. If the improvement of the man himself is aimed at, it is assumed that he has a conscience which can be worked upon and made to deter him from similar offences in future.

The word *purpose* has here been used in a sense to which it is perhaps worth while to call attention. Adaptation of means to an end may be produced in two ways that we at present know of; by processes of natural selection, and by the agency of an intelligence in which an image or idea of the end preceded the use of the means. In both cases the existence of the adaptation is accounted for by the necessity or utility of the end. It seems to me convenient to use the word *purpose* as meaning generally the end to which certain means are adapted, both in these two cases, and in any other that may hereafter become known, provided only that the adaptation is accounted for by the necessity or utility of the end. And there seems no objection to the use of the phrase 'final cause' in this wider sense, if it is to be kept at all. The word 'design' might then be kept for the special case of adaptation by an intelligence.

And we may then say that since the process of natural selection has been understood, *purpose* has ceased to suggest *design* to instructed people, except in cases where the agency of man is independently probable.

When a man can be punished for doing wrong with approval of the tribal self, he is said to be *responsible.* Responsibility implies two things:—(1), The act was a product of the man's character and of the circumstances, and his character may to a certain extent be inferred from the act; (2), The man had a conscience which might have been so worked upon as to prevent his doing the act. Unless the first condition be fulfilled, we cannot reasonably take any action at all in regard to the man, but only in regard to the offence. In the case of crimes of violence, for example, we might carry a six-shooter to protect ourselves against similar possibilities, but unless the fact of a man's having once committed a murder made it probable that he would do the like again, it would clearly be absurd and unreasonable to lynch the man. That is to say, we assume an uniformity of connexion between character and actions, infer a man's character from his past actions, and endeavour to provide against his future actions either by destroying him or by changing his character. I think it will be found that in all those cases where we not only deal with the offence but treat it with moral reprobation, we imply the existence of a conscience which might have been worked upon to improve the character. Why, for example, do we not regard a lunatic as responsible? Because we are in possession of information about his character derived not only from his one offence but from other facts, whereby we

know that even if he had a conscience left, his mind is so diseased that it is impossible by moral reprobation alone to change his character so that it may be subsequently relied upon. With his cure from disease and the restored validity of this condition, responsibility returns. There are, of course, cases in which an irresponsible person is punished as if he were responsible, *pour encourager les autres* who are responsible. The question of the right or wrong of this procedure is the question of its average effect on the character of men at any particular time.

The Categorical Imperative.

May we now say that the maxims of Ethic are hypothetical maxims? I think we may, and that in showing why we shall explain the apparent difference between them and other maxims belonging to an early stage of science. In the first place, ethical maxims are learned by the tribe and not by the individual. Those tribes have on the whole survived in which conscience approved such actions as tended to the improvement of men's characters as citizens and therefore to the survival of the tribe. Hence it is that the moral sense of the individual, though founded on the experience of the tribe, is purely intuitive; conscience gives no reasons. Notwithstanding this, the ethical maxims are presented to us as conditional; if you want to live together in this complicated way, your ways must be straight and not crooked, you must seek the truth and love no lie. Suppose we answer, 'I don't want to live together with other men in this complicated way; and so I shall not do as you ell me.' That is not the end of the matter,

as it might be with other scientific precepts. For obvious reasons it is *right* in this case to reply, 'Then in the name of my people I do not like you,' and to express this dislike by appropriate methods. And the offender, being descended from a social race, is unable to escape his conscience, the voice of his tribal self which says, 'In the name of the tribe, I hate myself for this treason that I have done.'

There are two reasons, then, why ethical maxims appear to be unconditional. First, they are acquired from experience not directly but by tribal selection, and therefore in the mind of the individual they do not rest upon the true reasons for them. Secondly, although they are conditional, the absence of the condition in one born of a social race is rightly visited by moral reprobation.

Ethics are based on Uniformity.

I have already observed that to deal with men as a means of influencing their actions implies that these actions are a product of character and circumstances; and that moral reprobation and responsibility cannot exist unless we assume the efficacy of certain special means of influencing character. It is not necessary to point out that such considerations involve that uniformity of nature which underlies the possibility of even unconscious adaptations to experience, of language, and of general conceptions and statements. It may be asked 'Are you quite sure that these observed uniformities between motive and action, between character and motive, between social influence and change of character, are absolutely exact in the form in which

you state them, or indeed that they are exact laws of any form? May there not be very slight divergences from exact laws, which will allow of the action of an "uncaused will," or of the interference of some "extramundane force"?' I am sure I do not know. But this I do know: that our sense of right and wrong is derived from such order as we can observe, and not from such caprice of disorder as we may fancifully conjecture; and that to whatever extent a divergence from exactness became sensible, to that extent it would destroy the most widespread and worthy of the acquisitions of mankind.

The Final Standard.

By these views we are led to conclusions partly negative, partly positive; of which, as might be expected, the negative are the most definite.

First, then, Ethic is a matter of the tribe or community, and therefore there are no 'self-regarding virtues.' The qualities of courage, prudence, &c., can only be *rightly* encouraged in so far as they are shown to conduce to the efficiency of a citizen; that is, in so far as they cease to be self-regarding. The duty of private judgment, of searching after truth, the sacredness of belief which ought not to be misused on unproved statements, follow only on showing of the enormous importance to society of a true knowledge of things. And any diversion of conscience from its sole allegiance to the community is condemned *à priori* in the very nature of right and wrong.

Next, the end of Ethic is not the greatest happiness of the greatest number. Your happiness is of no use to

the community, except in so far as it tends to make you a more efficient citizen—that is to say, happiness is not to be desired for its own sake, but for the sake of something else. If any end is pointed to, it is the end of increased efficiency in each man's special work, as well as in the social functions which are comman to all. A man must strive to be a better citizen, a better workman, a better son, husband, or father. *Farvi migliori; questo ha da essere lo scopo della vostra vita.*[1]

Again, Piety is not Altruism. It is not the doing good to others as others, but the service of the community by a member of it, who loses in that service the consciousness that he is anything different from the community.

The social organism, like the individual, may be healthy or diseased. Health and disease are very difficult things to define accurately: but for practical purposes, there are certain states about which no mistake can be made. When we have even a very imperfect catalogue and description of states that are clearly and certainly diseases, we may form a rough preliminary definition of health by saying that it means the absence of all these states. Now the health of society involves among other things, that right is done by the individuals composing it. And certain social diseases consist in a wrong direction of the conscience. Hence the determination of abstract right depends on the study of healthy and diseased states of society. How much light can be got for this end from the historical records we possess? A very great deal, if, as I believe, for ethical purposes the nature of man and of society may

[1] Mazzini, Doveri dell' Uomo.

be taken as approximately constant during the few thousand years of which we have distinct records.

The matters of fact on which rational ethic must be founded are the laws of modification of character, and the evidence of history as to those kinds of character which have most aided the improvement of the race. For although the moral sense is intuitive, it must for the future be directed by our conscious discovery of the tribal purpose which it serves.

RIGHT AND WRONG:

THE SCIENTIFIC GROUND OF THEIR DISTINCTION.[1]

THE questions which are here to be considered are especially and peculiarly everybody's questions. It is not everybody's business to be an engineer, or a doctor, or a carpenter, or a soldier; but it is everybody's business to be a citizen. The doctrines and precepts which guide the practice of the good engineer are of interest to him who uses them and to those whose business it is to investigate them by mechanical science; the rest of us neither obey nor disobey them. But the doctrines and precepts of morality, which guide the practice of the good citizen, are of interest to all; they must be either obeyed or disobeyed by every human being who is not hopelessly and for ever separated from the rest of mankind. No one can say, therefore, that in this inquiry we are not minding our own business, that we are meddling with other men's affairs. We are in fact studying the principles of our profession, so far as we are able; a necessary thing for every man who wishes to do good work in it.

Along with the character of universal interest which belongs to our subject there goes another. What is everybody's practical business is also to a large extent

[1] Sunday Lecture Society, November 7, 1875; 'Fortnightly Review,' December, 1875.

what everybody knows; and it may be reasonably expected that a discourse about Right and Wrong will be full of platitudes and truisms. The expectation is a just one. The considerations I have to offer are of the very oldest and the very simplest commonplace and common sense; and no one can be more astonished than I am that there should be any reason to speak of them at all. But there is reason to speak of them, because platitudes are not all of one kind. Some platitudes have a definite meaning and a practical application, and are established by the uniform and long-continued experience of all people. Other platitudes, having no definite meaning and no practical application, seem not to be worth anybody's while to test; and these are quite sufficiently established by mere assertion, if it is audacious enough to begin with and persistent enough afterwards. It is in order to distinguish these two kinds of platitude from one another, and to make sure that those which we retain form a body of doctrine consistent with itself and with the rest of our beliefs, that we undertake this examination of obvious and widespread principles.

First of all, then, what are the facts?

We say that it is wrong to murder, to steal, to tell lies, and that it is right to take care of our families. When we say in this sense that one action is right and another wrong, we have a certain feeling towards the action which is peculiar and not quite like any other feeling. It is clearly a feeling towards the action and not towards the man who does it; because we speak of hating the sin and loving the sinner. We might reasonably dislike a man whom we knew or suspected to be a murderer, because of the natural fear that he might

murder us; and we might like our own parents for taking care of us. But everybody knows that these feelings are something quite different from the feeling which condemns murder as a wrong thing, and approves parental care as a right thing. I say nothing here about the possibility of analysing this feeling, or proving that it arises by combination of other feelings; all I want to notice is that it is as distinct and recognizable as the feeling of pleasure in a sweet taste or of displeasure at a toothache. In speaking of right and wrong, we speak of qualities of action which arouse definite feelings that everybody knows and recognizes. It is not necessary, then, to give a definition at the outset; we are going to use familiar terms which have a definite meaning in the same sense in which everybody uses them. We may ultimately come to something like a definition; but what we have to do first is to collect the facts and see what can be made of them, just as if we were going to talk about limestone, or parents and children, or fuel.[1]

It is easy to conceive that murder and theft and neglect of the young might be considered wrong in a very simple state of society. But we find at present that the condemnation of these actions does not stand alone; it goes with the condemnation of a great number of other actions which seem to be included with the obviously criminal action in a sort of general rule. The wrongness of murder, for example, belongs in a less degree to any form of bodily injury that one man may inflict on another; and it is even extended so as to include injuries to his reputation or his feelings. I make

[1] These subjects were treated in the Lectures which immediately preceded and followed the present one.

these more refined precepts follow in the train of the more obvious and rough ones, because this appears to have been the traditional order of their establishment. 'He that makes his neighbour blush in public,' says the Mishna, 'is as if he had shed his blood.' In the same way the rough condemnation of stealing carries with it a condemnation of more refined forms of dishonesty: we do not hesitate to say that it is wrong for a tradesman to adulterate his goods, or for a labourer to scamp his work. We not only say that it is wrong to tell lies, but that it is wrong to deceive in other more ingenious ways; wrong to use words so that they shall have one sense to some people and another sense to other people; wrong to suppress the truth when that suppression leads to false belief in others. And again, the duty of parents towards their children is seen to be a special case of a very large and varied class of duties towards that great family to which we belong—to the fatherland and them that dwell therein. The word *duty* which I have here used, has as definite a sense to the general mind as the words *right* and *wrong*; we say that it is right to do our duty, and wrong to neglect it. These duties to the community serve in our minds to explain and define our duties to individuals. It is wrong to kill anyone; unless we are an executioner, when it may be our duty to kill a criminal; or a soldier, when it may be our duty to kill the enemy of our country; and in general it is wrong to injure any man in any way in our private capacity and for our own sakes. Thus if a man injures us, it is only right to retaliate on behalf of other men. Of two men in a desert island, if one takes away the other's cloak, it may or may not be right for the other

to let him have his coat also; but if a man takes away my cloak while we both live in society, it is my duty to use such means as I can to prevent him from taking away other people's cloaks. Observe that I am endeavouring to describe the facts of the moral feelings of Englishmen, such as they are now.

The last remark leads us to another platitude of exceedingly ancient date. We said that it was wrong to injure any man in our private capacity and for our own sakes. A rule like this differs from all the others that we have considered, because it not only deals with physical acts, words and deeds which can be observed and known by others, but also with thoughts which are known only to the man himself. Who can tell whether a given act of punishment was done from a private or from a public motive? Only the agent himself. And yet if the punishment was just and within the law, we should condemn the man in the one case and approve him in the other. This pursuit of the actions of men to their very sources, in the feelings which they only can know, is as ancient as any morality we know of, and extends to the whole range of it. Injury to another man arises from anger, malice, hatred, revenge; these feelings are condemned as wrong. But feelings are not immediately under our control, in the same way that overt actions are: I can shake anybody by the hand if I like, but I cannot always feel friendly to him. Nevertheless we can pay attention to such aspects of the circumstances, and we can put ourselves into such conditions, that our feelings get gradually modified in one way or the other; we form a habit of checking our anger by calling up certain images and considerations, whereby

in time the offending passion is brought into subjection and control. Accordingly we say that it is right to acquire and to exercise this control; and the control is supposed to exist whenever we say that one feeling or disposition of mind is right and another wrong. Thus, in connexion with the precept against stealing, we condemn envy and covetousness; we applaud a sensitive honesty which shudders at anything underhand or dishonourable. In connexion with the rough precept against lying, we have built up and are still building a great fabric of intellectual morality, whereby a man is forbidden to tell lies to himself, and is commanded to practise candour and fairness and open-mindedness in his judgments, and to labour zealously in pursuit of the truth. And in connexion with the duty to our families, we say that it is right to cultivate public spirit, a quick sense of sympathy, and all that belongs to a social disposition.

Two other words are used in this connexion which it seems necessary to mention. When we regard an action as right or wrong for ourselves, this feeling about the action impels us to do it or not to do it, as the case may be. We may say that the moral sense acts in this case as a motive; meaning by moral sense only the feeling in regard to an action which is considered as right or wrong, and by motive something which impels us to act. Of course there may be other motives at work at the same time, and it does not at all follow that we shall do the right action or abstain from the wrong one. This we all know to our cost. But still our feeling about the rightness or wrongness of an action does operate as a motive when we think of the action as being

done by us; and when so operating it is called *conscience.* I have nothing to do at present with the questions about conscience, whether it is a result of education, whether it can be explained by self-love, and so forth; I am only concerned in describing well-known facts, and in getting as clear as I can about the meaning of well-known words. Conscience, then, is the whole aggregate of our feelings about actions as being right or wrong, regarded as tending to make us do the right actions and avoid the wrong ones. We also say sometimes, in answer to the question, 'How do you know that this is right or wrong?' 'My conscience tells me so.' And this way of speaking is quite analogous to other expressions of the same form; thus if I put my hand into water, and you ask me how I know that it is hot, I might say, 'My feeling of warmth tells me so.'

When we consider a right or a wrong action as done by another person, we think of that person as worthy of moral approbation or reprobation. He may be punished or not; but in any case this feeling towards him is quite different from the feeling of dislike towards a person injurious to us, or of disappointment at a machine which will not go.

Whenever we can morally approve or disapprove a man for his action, we say that he is morally responsible for it, and *vice versâ.* To say that a man is not morally responsible for his actions is the same thing as to say that it would be unreasonable to praise or blame him for them.

The statement that we ourselves are morally responsible is somewhat more complicated, but the meaning is very easily made out; namely, that another person

may reasonably regard our actions as right or wrong, and may praise or blame us for them.

We can now, I suppose, understand one another pretty clearly in using the words right and wrong, conscience, responsibility; and we have made a rapid survey of the facts of the case in our own country at the present time. Of course I do not pretend that this survey in any way approaches to completeness; but it will supply us at least with enough facts to enable us to deal always with concrete examples instead of remaining in generalities; and it may serve to show pretty fairly what the moral sense of an Englishman is like. We must next consider what account we can give of these facts by the scientific method.

But first let us stop to note that we really have used the scientific method in making this first step; and also that to the same extent the method has been used by all serious moralists. Some would have us define virtue, to begin with, in terms of some other thing which is not virtue, and then work out from our definition all the details of what we ought to do. So Plato said that virtue was knowledge, Aristotle that it was the golden mean, and Bentham said that the right action was that which conduced to the greatest happiness of the greatest number. But so also, in physical speculations, Thales said that everything was Water, and Heraclitus said it was All-becoming, and Empedocles said it was made out of Four Elements, and Pythagoras said it was Number. But we only began to know about things when people looked straight at the facts, and made what they could out of them; and that is the only way in which we can know anything about right and wrong. Moreover, it is

the way in which the great moralists have set to work, when they came to treat of verifiable things and not of theories all in the air. A great many people think of a prophet as a man who, all by himself, or from some secret source, gets the belief that this thing is right and that thing wrong. And then (they imagine) he gets up and goes about persuading other people to feel as he does about it; and so it becomes a part of their conscience, and a new duty is created. This may be in some cases, but I have never met with any example of it in history. When Socrates puzzled the Greeks by asking them what they precisely meant by Goodness and Justice and Virtue, the mere existence of the words shows that the people, as a whole, possessed a moral sense, and felt that certain things were right and others wrong. What the moralist did was to show the connexion between different virtues, the likeness of virtue to certain other things, the implications which a thoughtful man could find in the common language. Wherever the Greek moral sense had come from, it was there in the people before it could be enforced by a prophet or discussed by a philosopher. Again, we find a wonderful collection of moral aphorisms in those shrewd sayings of the Jewish fathers which are preserved in the Mishna or oral law. Some of this teaching is familiar to us all from the popular exposition of it which is contained in the three first Gospels. But the very plainness and homeliness of the precepts shows that they are just acute statements of what was already felt by the popular common sense; protesting, in many cases, against the formalism of the ceremonial law with which they are curiously mixed up. The Rabbis even show a

jealousy of prophetic interference, as if they knew well that it takes not one man, but many men, to feel what is right. When a certain Rabbi Eliezer, being worsted in argument, cried out, 'If I am right, let heaven pronounce in my favour!' there was heard a Bath-kol or voice from the skies, saying, 'Do you venture to dispute with Rabbi Eliezer, who is an authority on all religious questions?' But Rabbi Joshua rose and said, 'Our law is not in heaven, but in the book which dates from Sinai, and which teaches us that in matters of discussion the majority makes the law.'[1]

One of the most important expressions of the moral sense for all time is that of the Stoic philosophy, especially after its reception among the Romans. It is here that we find the enthusiasm of humanity—the *caritas generis humani*—which is so large and important a feature in all modern conceptions of morality, and whose widespread influence upon Roman citizens may be traced in the Epistles of St. Paul. In the Stoic emperors, also, we find probably the earliest example of great moral principles consciously applied to legislation on a large scale. But are we to attribute this to the individual insight of the Stoic philosophers? It might seem at first sight that we must, if we are to listen to that vulgar vituperation of the older culture which has descended to us from those who had everything to gain by its destruction.[2] We hear enough of the luxurious

[1] Treatise Baba Bathra, 59 *b*. I derive this story and reference from a most interesting book, 'Kôl Kôre (Vox Clamantis), La Bible, le Talmud, et l'Evangile; par le R. Elie Soloweyczyk. Paris: E. Brière. 1870.'

[2] Compare these passages from Merivale ('Romans under the Empire,' vi.), to whom 'it seems a duty to protest against the common tendency of Christian moralists to dwell only on the dark side of Pagan society, in order to heighten by contrast the blessings of the Gospel':—

feasting of the Roman-capital, how it would almost have taxed the resources of a modern pastrycook; of the cruelty of gladiatorial shows, how they were nearly as bad as *autos-da-fè*, except that a man had his fair chance, and was not tortured for torture's sake; of the oppression of provincials by people like Verres, of whom it may even be said that if they had been the East India Company they could not have been worse; of the complaints of Tacitus against bad and mad emperors (as Sir Henry Maine says); and of the still more serious complaints of the modern historian against the excessive taxation[1] which was one great cause of the fall of the empire. Of all this we are told a great deal; but we are not told of the many thousands of honourable men who carried civilization to the ends of the known world,

'Much candour and discrimination are required in comparing the sins of one age with those of another. . . . . the cruelty of our inquisitions and sectarian persecutions, of our laws against sorcery, our serfdom and our slavery; the petty fraudulence we tolerate in almost every class and calling of the community; the bold front worn by our open sensuality; the deeper degradation of that which is concealed; all these leave us little room for boasting of our modern discipline, and must deter the thoughtful inquirer from too confidently contrasting the morals of the old world and the new.'

'Even at Rome, in the worst of times . . . all the relations of life were adorned in turn with bright instances of devotion, and mankind transacted their business with an ordinary confidence in the force of conscience and right reason. The steady development of enlightened legal principles conclusively proves the general dependence upon law as a guide and corrector of manners. In the camp, however, more especially, as the chief sphere of this purifying activity, the great qualities of the Roman character continued to be plainly manifested. This history of the Cæsars presents to us a constant succession of brave, patient, resolute, and faithful soldiers, men deeply impressed with a sense of duty, superior to vanity, despisers of boasting, content to toil in obscurity and shed their blood at the frontiers of the empire, unrepining at the cold mistrust of their masters, not clamorous for the honours so sparingly awarded to them, but satisfied in the daily work of their hands, and full of faith in the national destiny which they were daily accomplishing.'

[1] Finlay, 'Greece under the Romans.'

and administered a mighty empire so that it was loved and worshipped to the furthest corner of it. It is to these men and their common action that we must attribute the morality which found its organized expression in the writings of the Stoic philosophers. From these three cases we may gather that Right is a thing which must be done before it can be talked about, although after that it may only too easily be talked about without being done. Individual effort and energy may insist upon getting that done which was already felt to be right; and individual insight and acumen may point out consequences of an action which bring it under previously known moral rules. There is another dispute of the Rabbis that may serve to show what is meant by this. It was forbidden by the law to have any dealings with the Sabæan idolaters during the week preceding their idolatrous feasts. But the doctors discussed the case in which one of these idolaters owes you a bill; are you to let him pay it during that week or not? The school of Shammai said 'No; for he will want all his money to enjoy himself at the feast.' But the school of Hillel said, 'Yes, let him pay it; for how can he enjoy his feast while his bills are unpaid?' The question here is about the consequences of an action; but there is no dispute about the moral principle, which is that consideration and kindness are to be shown to idolaters, even in the matter of their idolatrous rites.

It seems, then, that we are no worse off than anybody else who has studied this subject, in finding our materials ready made for us; sufficiently definite meanings given in the common speech to the words right and

wrong, good and bad, with which we have to deal; a fair body of facts familiarly known, which we have to organize and account for as best we can. But our special inquiry is, what account can be given of these facts by the scientific method? to which end we cannot do better than fix our ideas as well as we can upon the character and scope of that method.

Now the scientific method is a method of getting knowledge by inference, and that of two different kinds. One kind of inference is that which is used in the physical and natural sciences, and it enables us to go from known phenomena to unknown phenomena. Because a stone is heavy in the morning, I infer that it will be heavy in the afternoon; and I infer this by assuming a certain uniformity of nature. The sort of uniformity that I assume depends upon the extent of my scientific education; the rules of inference become more and more definite as we go on. At first I might assume that all things are always alike; this would not be true, but it has to be assumed in a vague way, in order that a thing may have the same name at different times. Afterwards I get the more definite belief that certain particular qualities, like weight, have nothing to do with the time of day; and subsequently I find that weight has nothing to do with the shape of the stone, but only with the quantity of it. The uniformity which we assume, then, is not that vague one that we started with, but a chastened and corrected uniformity. I might go on to suppose, for example, that the weight of the stone had nothing to do with the place where it was; and a great deal might be said for this supposition. It would, however, have to be corrected when it was found that the

weight varies slightly in different latitudes. On the other hand, I should find that this variation was just the same for my stone as for a piece of iron or wood; that it had nothing to do with the kind of matter. And so I might be led to the conclusion that all matter is heavy, and that the weight of it depends only on its quantity and its position relative to the earth. You see here that I go on arriving at conclusions always of this form; that some one circumstance or quality has nothing to do with some other circumstance or quality. I begin by assuming that it is independent of everything; I end by finding that it is independent of some definite things. That is, I begin by assuming a vague uniformity. I always use this assumption to infer from some one fact a great number of other facts; but as my education proceeds, I get to know what sort of things may be inferred and what may not. An observer of scientific mind takes note of just those things from which inferences may be drawn, and passes by the rest. If an astronomer, observing the sun, were to record the fact that at the moment when a sun-spot began to shrink there was a rap at his front door, we should know that he was not up to his work. But if he records that sun-spots are thickest every eleven years, and that this is also the period of extra cloudiness in Jupiter, the observation may or may not be confirmed, and it may or may not lead to inferences of importance; but still it is the kind of thing from which inferences may be drawn. There is always a certain instinct among instructed people which tells them in this way what kinds of inferences may be drawn; and this is the unconscious effect of the definite uniformity which they

have been led to assume in nature. It may subsequently be organized into a law or general truth, and no doubt becomes a surer guide by that process. Then it goes to form the more precise instinct of the next generation.

What we have said about this first kind of inference, which goes from phenomena to phenomena, is shortly this. It proceeds upon an assumption of uniformity in nature; and this assumption is not fixed and made once for all, but is a changing and growing thing, becoming more definite as we go on.

If I were told to pick out some one character which especially colours this guiding conception of uniformity in our present stage of science, I should certainly reply, Atomism. The form of this with which we are most familiar is the molecular theory of bodies; which represents all bodies as made up of small elements of uniform character, each practically having relations only with the adjacent ones, and these relations the same all through—namely, some simple mechanical action upon each other's motions. But this is only a particular case. A palace, a cottage, the tunnel of the underground railway, and a factory chimney, are all built of bricks; the bricks are alike in all these cases, each brick is practically related only to the adjacent ones, and the relation is throughout the same, namely, two flat sides are stuck together with mortar. There is an atomism in the sciences of number, of quantity, of space; the theorems of geometry are groupings of individual points, each related only to the adjacent ones by certain definite laws. But what concerns us chiefly at present is the atomism of human physiology. Just as

every solid is built up of molecules, so the nervous system is built up of nerve-threads and nerve-corpuscles. We owe to Mr. Lewes our very best thanks for the stress which he has laid on the doctrine that nerve-fibre is uniform in structure and function, and for the word *neurility*, which expresses its common properties. And similar gratitude is due to Dr. Hughlings Jackson for his long defence of the proposition that the element of nervous structure and function is a sensori-motor process. In structure, this is two fibres or bundles of fibres going to the same grey corpuscle; in function it is a message travelling up one fibre or bundle to the corpuscle, and then down the other fibre or bundle.[1] Out of this, as a brick, the house of our life is built. All these simple elementary processes are alike, and each is practically related only to the adjacent ones; the relation being in all cases of the same kind, viz., the passage from a simple to a complex message, or *vice versâ*.

The result of atomism in any form, dealing with any subject, is that the principle of uniformity is hunted down into the elements of things; it is resolved into the uniformity of these elements or atoms, and of the relations of those which are next to each other. By an element or an atom we do not here mean something absolutely simple or indivisible, for a molecule, a brick, and a nerve-process are all very complex things. We only mean that, for the purpose in hand, the properties of the still more complex thing which is made of them have nothing to do with the complexities or the

[1] Mr. Herbert Spencer had assigned a slightly different element.—'Principles of Psychology,' vol. i., p. 28.

differences of these elements. The solid made of molecules, the house made of bricks, the nervous system made of sensori-motor processes, are nothing more than collections of these practically uniform elements, having certain relations of nextness, and behaviour uniformly depending on that nextness.

The inference of phenomena from phenomena, then, is based upon an assumption of uniformity, which in the present stage of science may be called an atomic uniformity.

The other mode of inference which belongs to the scientific method is that which is used in what are called the mental and moral sciences; and it enables us to go from phenomena to the facts which underlie phenomena, and which are themselves not phenomena at all. If I pinch your arm, and you draw it away and make a face, I infer that you have felt pain. I infer this by assuming that you have a consciousness similar to my own, and related to your perception of your body as my consciousness is related to my perception of my body. Now is this the same assumption as before, a mere assumption of the uniformity of nature? It certainly seems like it at first; but if we think about it we shall find that there is a very profound difference between them. In physical inference I go from phenomena to phenomena; that is, from the knowledge of certain appearances or representations actually present to my mind I infer certain other appearances that might be present to my mind. From the weight of a stone in the morning—that is, from my feeling of its weight, or my perception of the process of weighing it, I infer that the stone will be heavy in the afternoon—that is, I infer the possibility of similar feel-

ings and perceptions in me at another time. The whole process relates to me and my perceptions, to things contained in my mind. But when I infer that you are conscious from what you say or do, I pass from that which is *my* feeling or perception, which is in my mind and part of me, to that which is not my feeling at all, which is outside me altogether, namely, *your* feelings and perceptions. Now there is no possible physical inference, no inference of phenomena from phenomena, that will help me over that gulf. I am obliged to admit that this second kind of inference depends upon another assumption, not included in the assumption of the uniformity of phenomena.

How does a dream differ from waking life? In a fairly coherent dream everything seems quite real, and it is rare, I think, with most people to know in a dream that they are dreaming. Now, if a dream is sufficiently vivid and coherent, all physical inferences are just as valid in it as they are in waking life. In a hazy or imperfect dream, it is true, things melt into one another unexpectedly and unaccountably; we fly, remove mountains, and stop runaway horses with a finger. But there is nothing in the mere nature of a dream to hinder it from being an exact copy of waking experience. If I find a stone heavy in one part of my dream, and infer that it is heavy at some subsequent part, the inference will be verified if the dream is coherent enough; I shall go to the stone, lift it up, and find it as heavy as before. And the same thing is true of all inferences of phenomena from phenomena. For physical purposes a dream is just as good as real life; the only difference is in vividness and coherence.

What, then, hinders us from saying that life is all a dream? If the phenomena we dream of are just as good and real phenomena as those we see and feel when we are awake, what right have we to say that the material universe has any more existence apart from our minds than the things we see and feel in our dreams? The answer which Berkeley gave to that question was, No right at all. The physical universe which I see and feel, and infer, is just my dream and nothing else; that which you see is your dream; only it so happens that all our dreams agree in many respects. This doctrine of Berkeley's has now been so far confirmed by the physiology of the senses, that it is no longer a metaphysical speculation, but a scientifically established fact.

But there is a difference between dreams and waking life, which is of far too great importance for any of us to be in danger of neglecting it. When I see a man in my dream, there is just as good a *body* as if I were awake; muscles, nerves, circulation, capability of adapting means to ends. If only the dream is coherent enough, no physical test can establish that it is a dream. In both cases I see and feel the same thing. In both cases I assume the existence of more than I can see and feel, namely, the consciousness of this other man. But now here is a great difference, and the only difference—in a dream this assumption is wrong; in waking life it is right. The man I see in my dream is a *mere* machine, a bundle of phenomena with no underlying reality; there is no consciousness involved except my consciousness, no feeling in the case except my feelings. The man I see in waking life is more than a bundle of phe-

nomena; his body and its actions are phenomena, but these phenomena are merely the symbols and representatives in my mind of a reality which is outside my mind, namely, the consciousness of the man himself which is represented by the working of his brain, and the simpler quasi-mental facts, not woven into his consciousness, which are represented by the working of the rest of his body. What makes life not to be a dream is the existence of those facts which we arrive at by our second process of inference; the consciousness of men and the higher animals, the sub-consciousness of lower organisms and the quasi-mental facts which go along with the motions of inanimate matter. In a book which is very largely and deservedly known by heart, 'Through the Looking-glass,' there is a very instructive discussion upon this point. Alice has been taken to see the Red King as he lies snoring; and Tweedledee asks, 'Do you know what he is dreaming about?' 'Nobody can guess that,' replies Alice. 'Why, about *you*,' he says triumphantly. 'And if he stopped dreaming about you, where do you suppose you'd be?' 'Where I am now of course,' said Alice. 'Not you,' said Tweedledee, 'you'd be nowhere. You are only a sort of thing in his dream.' 'If that there King was to wake,' added Tweedledum, 'you'd go out, bang! just like a candle. Alice was quite right in regarding these remarks as unphilosophical. The fact that she could see, think, and feel was proof positive that she was not a sort of thing in anybody's dream. This is the meaning of that saying, *Cogito ergo sum*, of Descartes. By him, and by Spinoza after him, the verb *cogito* and the substantive *cogitatio* were used to denote consciousness in general,

any kind of feeling, even what we now call sub-consciousness. The saying means that feeling exists in and for itself, not as a quality or modification or state or manifestation of anything else.

We are obliged in every hour of our lives to act upon beliefs which have been arrived at by inferences of these two kinds; inferences based on the assumption of uniformity in nature, and inferences which add to this the assumption of feelings which are not our own. By organizing the 'common sense' which embodies the first class of inferences, we build up the physical sciences; that is to say, all those sciences which deal with the physical, material, or phenomenal universe, whether animate or inanimate. And so by organizing the common sense which embodies the second class of inferences, we build up various sciences of mind. The description and classification of feelings, the facts of their association with each other, and of their simultaneity with phenomena of nerve-action,—all this belongs to psychology, which may be historical and comparative. The doctrine of certain special classes of feelings is organized into the special sciences of those feelings; thus the facts about the feelings which we are now considering, about the feelings of moral approbation and reprobation, are organized into the science of ethics, and the facts about the feeling of beauty or ugliness are organized into the science of æsthetics, or, as it is sometimes called, the philosophy of art. For all of these the uniformity of nature has to be assumed as a basis of inference; but over and above that it is necessary to assume that other men are conscious in the same way that I am. Now in these sciences of mind, just as in the

physical sciences, the uniformity which is assumed in the inferred mental facts is a growing thing which becomes more definite as we go on, and each successive generation of observers knows better what to observe and what sort of inferences may be drawn from observed things. But, moreover, it is as true of the mental sciences as of the physical ones that the uniformity is in the present stage of science an *atomic* uniformity. We have learned to regard our consciousness as made up of elements practically alike, having relations of succession in time and of contiguity at each instant, which relations are in all cases practically the same. The element of consciousness is the transference of an impression into the beginning of action. Our mental life is a structure made out of such elements, just as the working of our nervous system is made out of sensori-motor processes. And accordingly the interaction of the two branches of science leads us to regard the mental facts as the realities or things-in-themselves, of which the material phenomena are mere pictures or symbols. The final result seems to be that atomism is carried beyond phenomena into the realities which phenomena represent; and that the observed uniformities of nature, in so far as they can be expressed in the language of atomism, are actual uniformities of things in themselves.

So much for the two things which I have promised to bring together; the facts of our moral feelings, and the scientific method. It may appear that the latter has been expounded at more length than was necessary for the treatment of this particular subject; but the justification for this length is to be found in certain common objections to the claims of science to be the

sole judge of mental and moral questions. Some of the chief of these objections I will now mention.

It is sometimes said that science can only deal with what is, but that art and morals deal with what ought to be. The saying is perfectly true, but it is quite consistent with what is equally true, that the facts of art and morals are fit subject-matter of science. I may describe all that I have in my house, and I may state everything that I want in my house; these are two very different things, but they are equally statements of facts. One is a statement about phenomena, about the objects which are actually in my possession; the other is a statement about my feelings, about my wants and desires. There are facts, to be got at by common sense, about the kind of thing that a man of a certain character and occupation will like to have in his house, and these facts may be organized into general tatements on the assumption of uniformity in nature. Now the organized results of common sense dealing with facts are just science and nothing else. And in the same way I may say what men do at the present day, how we live now, or I may say what we ought to do, namely, what course of conduct, if adopted, we should morally approve; and no doubt these would be two very different things. But each of them would be a statement of facts. One would belong to the sociology of our time; in so far as men's deeds could not be adequately described to us without some account of their feelings and intentions, it would involve facts belonging to psychology as well as facts belonging to the physical sciences. But the other would be an account of a particular class of our feelings, namely, those which we feel towards an action when it

is regarded as right or wrong. These facts may be organized by common sense on the assumption of uniformity in nature just as well as any other facts. And we shall see farther on that not only in this sense, but in a deeper and more abstract sense, 'what ought to be done' is a question for scientific enquiry.

The same objection is sometimes put into another form. It is said that laws of chemistry, for example, are general statements about what happens when bodies are treated in a certain way, and that such laws are fit matter for science; but that moral laws are different, because they tell us to do certain things, and we may or may not obey them. The mood of the one is indicative, of the other imperative. Now it is quite true that the word *law* in the expression 'law of nature,' and in the expressions 'law of morals,' 'law of the land,' has two totally different meanings, which no educated person will confound; and I am not aware that anyone has rested the claim of science to judge moral questions on what is no better than a stale and unprofitable pun. But two different things may be equally matters of scientific investigation, even when their names are alike in sound. A telegraph post is not the same thing as a post in the War Office, and yet the same intelligence may be used to investigate the conditions of the one and the other. That such and such things are right or wrong, that such and such laws are laws of morals or laws of the land, these are facts, just as the laws of chemistry are facts; and all facts belong to science, and are her portion for ever.

Again, it is sometimes said that moral questions have been authoritatively settled by other methods; that we

ought to accept this decision, and not to question it by any method of scientific inquiry; and that reason should give way to revelation on such matters. I hope before I have done to show just cause why we should pronounce on such teaching as this no light sentence of moral condemnation: first, because it is our duty to form those beliefs which are to guide our actions by the two scientific modes of inference, and by these alone; and, secondly, because the proposed mode of settling ethical questions by authority is contrary to the very nature of right and wrong.

Leaving this, then, for the present, I pass on to the most formidable objection that has been made to a scientific treatment of ethics. The objection is that the scientific method is not applicable to human action, because the rule of uniformity does not hold good. Whenever a man exercises his will, and makes a voluntary choice of one out of various possible courses, an event occurs whose relation to contiguous events cannot be included in a general statement applicable to all similar cases. There is something wholly capricious and disorderly, belonging to that moment only; and we have no right to conclude that if the circumstances were exactly repeated, and the man himself absolutely unaltered, he would choose the same course.

It is clear that if the doctrine here stated is true, the ground is really cut from under our feet, and we cannot deal with human action by the scientific method. I shall endeavour to show, moreover, that in this case, although we might still have a feeling of moral approbation or reprobation towards actions, yet we could not reasonably praise or blame men for their deeds, nor

regard them as morally responsible. So that, if my contention is just, to deprive us of the scientific method is practically to deprive us of morals altogether. On both grounds, therefore, it is of the greatest importance that we should define our position in regard to this controversy; if, indeed, that can be called a controversy in which the practical belief of all mankind and the consent of nearly all serious writers are on one side.

Let us in the first place consider a little more closely the connexion between conscience and responsibility. Words in common use, such as these two, have their meanings practically fixed before difficult controversies arise; but after the controversy has arisen each party gives that slight tinge to the meaning which best suits its own view of the question. Thus it appears to each that the common language obviously supports their own view, that this is the natural and primary view of the matter, and that the opponents are using words in a new meaning and wresting them from their proper sense. Now this is just my position. I have endeavoured so far to use all words in their common every-day sense, only making this as precise as I can; and, with two exceptions, of which due warning will be given, I shall do my best to continue this practice in future. I seem to myself to be talking the most obvious platitudes; but it must be remembered that those who take the opposite view will think I am perverting the English language.

There is a common meaning of the word 'responsible,' which though not the same as that of the phrase 'morally responsible,' may throw some light upon it. If we say of a book, 'A is responsible for the preface and the first half, and B is responsible for the rest,' we mean

that A wrote the preface and the first half. If two people go into a shop and choose a blue silk dress together, it might be said that A was responsible for its being silk and B for its being blue. Before they chose, the dress was undetermined both in colour and in material. A's choice fixed the material, and then it was undetermined only in colour. B's choice fixed the colour; and if we suppose that there were no more variable conditions (only one blue silk dress in the shop), the dress was then completely determined. In this sense of the word we say that a man is responsible for that part of an event which was undetermined when he was left out of account, and which became determined when he was taken account of. Suppose two narrow streets, one lying north and south, one east and west, and crossing one another. A man is put down where they cross, and has to walk. Then he must walk either north, south, east, or west, and he is not responsible for that; what he is responsible for is the choice of one of these four directions. May we not say in the present sense of the word that the external circumstances are responsible for the restriction on his choice? We should mean only that the fact of his going in one or other of the four directions was due to external circumstances, and not to him. Again, suppose I have a number of punches of various shapes, some square, some oblong, some oval, some round, and that I am going to punch a hole in a piece of paper. *Where* I shall punch the hole may be fixed by any kind of circumstances; but the shape of the hole depends on the punch I take. May we not say that the punch is responsible for the shape of the hole, but not for the position of it?

It may be said that this is not the whole of the meaning of the word 'responsible,' even in its loosest sense; that it ought never to be used except of a conscious agent. Still this is part of its meaning; if we regard an event as determined by a variety of circumstances, a man's choice being among them, we say that he is responsible for just that choice which is left him by the other circumstances.

When we ask the practical question, 'Who is responsible for so-and-so?' we want to find out who is to be got at in order that so-and-so may be altered. If I want to change the shape of the hole I make in my paper, I must change my punch; but this will be of no use if I want to change the position of the hole. If I want the colour of the dress changed from blue to green, it is B, and not A, that I must persuade.

We mean something more than this when we say that a man is *morally* responsible for an action. It seems to me that moral responsibility and conscience go together, both in regard to the man and in regard to the action. In order that a man may be morally responsible for an action, the man must have a conscience, and the action must be one in regard to which conscience is capable of acting as a motive, that is, the action must be capable of being right or wrong. If a child were left on a desert island and grew up wholly without a conscience, and then were brought among men, he would not be morally responsible for his actions until he had acquired a conscience by education. He would of course be *responsible*, in the sense just explained, for that part of them which was left undetermined by external circumstances, and if we wanted to alter his

actions in these respects we should have to do it by altering him. But it would be useless and unreasonable to attempt to do this by means of praise or blame, the expression of moral approbation or disapprobation, until he had acquired a conscience which could be worked upon by such means.

It seems, then, that in order that a man may be morally responsible for an action, three things are necessary:—

1. He might have done something else; that is to say, the action was not wholly determined by external circumstances, and he is responsible only for the choice which was left him.

2. He had a conscience.

3. The action was one in regard to the doing or not doing of which conscience might be a sufficient motive.

These three things are necessary, but it does not follow that they are sufficient. It is very commonly said that the action must be a *voluntary* one. It will be found, I think, that this is contained in my third condition, and also that the form of statement I have adopted exhibits more clearly the reason why the condition is necessary. We may say that an action is involuntary either when it is instinctive, or when one motive is so strong that there is no voluntary choice between motives. An involuntary cough produced by irritation of the glottis is no proper subject for blame or praise. A man is not responsible for it, because it is done by a part of his body without consulting *him*. What is meant by *him* in this case will require further investigation. Again, when a dipsomaniac has so great and overmastering an inclination to drink that we cannot

conceive of conscience being strong enough to conquer it, he is not responsible for that act, though he may be responsible for having got himself into the state. But if it is conceivable that a very strong conscience fully brought to bear might succeed in conquering the inclination, we may take a lenient view of the fall and say there was a very strong temptation, but we shall still regard it as a fall, and say that the man is responsible and a wrong has been done.[1]

But since it is just in this distinction between voluntary and involuntary action that the whole *crux* of the matter lies, let us examine more closely into it. I say that when I cough or sneeze involuntarily, it is really not I that cough or sneeze, but a part of my body which acts without consulting me. This action is determined for me by the circumstances, and is not part of the choice that is left to me, so that I am not responsible for it. The question comes then to determining how much is to be called *circumstances*, and how much is to be called *me*.

Now I want to describe what happens when I voluntarily do anything, and there are two courses open to me. I may describe the things in themselves, my feelings and the general course of my consciousness, trusting to the analogy between my consciousness and yours to make me understood; or I may describe these things as nature describes them to your senses, namely in terms of the phenomena of my nervous system, appealing to your memory of phenomena and your knowledge of physical action. I shall do both, because in some respects

[1] [It seems worth noting that this very closely coincides with the doctrine of modern English law on the question when and how far insanity excludes criminal responsibility.]

our knowledge is more complete from the one source, and in some respects from the other. When I look back and reflect upon a voluntary action, I seem to find that it differs from an involuntary action in the fact that a certain portion of my character has been consulted. There is always a suggestion of some sort, either the end of a train of thought or a new sensation; and there is an action ensuing, either the movement of a muscle or set of muscles, or the fixing of attention upon something. But between these two there is a consultation, as it were, of my past history. The suggestion is viewed in the light of everything bearing on it that I think of at the time, and in virtue of this light it moves me to act in one or more ways. Let us first suppose that no hesitation is involved, that only one way of acting is suggested, and I yield to this impulse and act in the particular way. This is the simplest kind of voluntary action. It differs from involuntary or instinctive action in the fact that with the latter there is no such conscious consultation of past history. If we describe these facts in terms of the phenomena which picture them to other minds, we shall say that in involuntary action a message passes straight through from the sensory to the motor centre, and so on to the muscles, without consulting the cerebrum; while in voluntary action the message is passed on from the sensory centre to the cerebrum, there translated into appropriate motor stimuli, carried down to the motor centre, and so on to the muscles. There may be other differences, but at least there is this difference. Now on the physical side that which determines what groups of cerebral fibres shall be set at work by the given message, and what groups of motor stimuli

shall be set at work by these, is the mechanism of my brain at the time; and on the mental side that which determines what memories shall be called up by the given sensation, and what motives these memories shall bring into action, is my mental character. We may say, then, in this simplest case of voluntary action, that when the suggestion is given it is the character of *me* which determines the character of the ensuing action; and consequently that I am responsible for choosing that particular course out of those which were left open to me by the external circumstances.

This is when I yield to the impulse. But suppose I do not; suppose that the original suggestion, viewed in the light of memory, sets various motives in action, each motive belonging to a certain class of things which I remember. Then I choose which of these motives shall prevail. Those who carefully watch themselves find out that a particular motive is made to prevail by the fixing of the attention upon that class of remembered things which calls up the motive. The physical side of this is the sending of blood to a certain set of nerves—namely, those whose action corresponds to the memories which are to be attended to. The sending of blood is accomplished by the pinching of arteries; and there are special nerves, called vaso-motor nerves, whose business it is to carry messages to the walls of the arteries and get them pinched. Now this act of directing the attention may be voluntary or involuntary, just like any other act. When the transformed and reinforced nerve-message gets to the vaso-motor centre, some part of it may be so predominant that a message goes straight off to the arteries, and sends a quantity of blood to the nerves supply-

ing that part; or the call for blood may be sent back for revision by the cerebrum, which is thus again consulted. To say the same thing in terms of my feelings, a particular class of memories roused by the original suggestion may seize upon my attention before I have time to choose what I will attend to; or the appeal may be carried to a deeper part of my character dealing with wider and more abstract conceptions, which views the conflicting motives in the light of a past experience of motives, and by that light is drawn to one or the other of them.

We thus get to a sort of motive of the second order or motive of motives. Is there any reason why we should not go on to a motive of the third order, and the fourth, and so on? None whatever that I know of, except that no one has ever observed such a thing. There seems plenty of room for the requisite mechanism on the physical side; and no one can say, on the mental side, how complex is the working of his consciousness. But we must carefully distinguish between the intellectual deliberation about motives, which applies to the future and the past, and the practical choice of motives in the moment of will. The former may be a train of any length and complexity: we have no reason to believe that the latter is more than engine and tender.

We are now in a position to classify actions in respect of the kind of responsibility which belongs to them; namely, we have—

1. Involuntary or instinctive actions.

2. Voluntary actions in which the choice of motives is involuntary.

3. Voluntary actions in which the choice of motives is voluntary.

In each of these cases what is responsible is that part of my character which determines what the action shall be. For instinctive actions we do not say that *I* am responsible, because the choice is made before I know anything about it. For voluntary actions I am responsible, because I make the choice; that is, the character of me is what determines the character of the action. In *me*, then, for this purpose, is included the aggregate of links of association which determines what memories shall be called up by a given suggestion, and what motives shall be set at work by these memories. But we distinguish this mass of passions and pleasures, desire and knowledge and pain, which makes up most of my character at the moment, from that inner and deeper motive-choosing self which is called Reason, and the Will, and the Ego; which is only responsible when motives are voluntarily chosen by directing attention to them. It is responsible only for the choice of one motive out of those presented to it, not for the nature of the motives which are presented.

But again, I may reasonably be blamed for what I did yesterday, or a week ago, or last year. This is because I am permanent; in so far as from my actions of that date an inference may be drawn about my character now, it is reasonable that I should be treated as praiseworthy or blameable. And within certain limits I am for the same reason responsible for what I am now, because within certain limits I have made myself. Even instinctive actions are dependent in many cases upon habits which may be altered by proper attention and

care; and still more the nature of the connexions between sensation and action, the associations of memory and motive, may be voluntarily modified if I choose to try. The habit of choosing among motives is one which may be acquired and strengthened by practice, and the strength of particular motives, by continually directing attention to them, may be almost indefinitely increased or diminished. Thus, if by *me* is meant not the instantaneous me of this moment, but the aggregate me of my past life, or even of the last year, the range of my responsibility is very largely increased. I am responsible for a very large portion of the circumstances which are now external to me; that is to say, I am responsible for certain of the restrictions on my own freedom. As the eagle was shot with an arrow that flew on its own feather, so I find myself bound with fetters of my proper forging.

Let us now endeavour to conceive an action which is not determined in any way by the character of the agent. If we ask, 'What makes it to be that action and no other?' we are told, 'The man's Ego.' The words are here used, it seems to me, in some non-natural sense, if in any sense at all. One thing makes another to be what it is when the characters of the two things are connected together by some general statement or rule. But we have to suppose that the character of the action is not connected with the character of the Ego by any general statement or rule. With the same Ego and the same circumstances of all kinds, anything within the limits imposed by the circumstances may happen at any moment. I find myself unable to conceive any distinct sense in which responsibility could apply in this case;

nor do I see at all how it would be reasonable to use praise or blame. If the action does not depend on the character, what is the use of trying to alter the character? Suppose, however, that this indeterminateness is only partial; that the character does add some restrictions to those already imposed by circumstances, but leaves the choice between certain actions undetermined, and to be settled by chance or the transcendental Ego. Is it not clear that the man would be responsible for precisely that part of the character of the action which was determined by his character, and not for what was left undetermined by it? For it is just that part which was determined by his character which it is reasonable to try to alter by altering him.

We who believe in uniformity are not the only people unable to conceive responsibility without it. These are the words of Sir W. Hamilton, as quoted by Mr. J. S. Mill:—[1]

'Nay, were we even to admit as true what we cannot think as possible, still the doctrine of a motiveless volition would be only casualism; and the free acts of an indifferent are, morally and rationally, as worthless as the pre-ordered passions of a determined will.'

'That, though inconceivable, a motiveless volition would, if conceived, be conceived as morally worthless, only shows our impotence more clearly.'

'Is the person an *original undetermined* cause of the determination of his will? If he be not, then he is not a *free agent*, and the scheme of Necessity is admitted. If he be, in the first place, it is impossible to *conceive* the possibility of this; and in the second, if the fact, though

[1] Examination, p. 495, 2nd ed.

inconceivable, be allowed, it is impossible to see how a cause, undetermined by any motive, can be a rational, moral, and accountable cause.'

It is true that Hamilton also says that the scheme of necessity is inconceivable, because it leads to an infinite non-commencement; and that 'the possibility of morality depends on the possibility of liberty; for if a man be not a free agent, he is not the author of his actions, and has, therefore, no responsibility—no moral personality at all.'

I know nothing about necessity; I only believe that nature is practically uniform even in human action. I know nothing about an infinitely distant past; I only know that I ought to base on uniformity those inferences which are to guide my actions. But that man is a free agent appears to me obvious, and that in the natural sense of the words. We need ask for no better definition than Kant's:—

'Will is a kind of causality belonging to living agents, in so far as they are rational; and freedom is such a property of that causality as enables them to be efficient agents independently of outside causes determining them; as, on the other hand, necessity (*Naturnothwendigkeit*) is that property of all irrational beings which consists in their being determined to activity by the influence of outside causes.'[1]

I believe that I am a free agent when my actions are independent of the control of circumstances outside me; and it seems a misuse of language to call me a free agent if my actions are determined by a transcendental Ego who is independent of the circumstances inside me

[1] 'Metaphysics of Ethics,' chap. iii.

—that is to say, of my character. The expression 'free will' has unfortunately been imported into mental science from a theological controversy rather different from the one we are now considering. It is surely too much to expect that good and serviceable English words should be sacrificed to a phantom.

In an admirable book, 'The Methods of Ethics,' Mr. Henry Sidgwick has stated, with supreme fairness and impartiality, both sides of this question. After setting forth the 'almost overwhelming cumulative proof' of uniformity in human action, he says that it seems 'more than balanced by a single argument on the other side: the immediate affirmation of consciousness in the moment of deliberate volition.' 'No amount of experience of the sway of motives ever tends to make me distrust my intuitive consciousness that in resolving, after deliberation, I exercise free choice as to which of the motives acting upon me shall prevail.'

The only answer to this argument is that it is not 'on the other side.' There is no doubt about the deliverance of consciousness; and even if our powers of self-observation had not been acute enough to discover it, the existence of some choice between motives would be proved by the existence of vaso-motor nerves. But perhaps the most instructive way of meeting arguments of this kind is to inquire what consciousness ought to say in order that its deliverances may be of any use in the controversy. It is affirmed, on the side of uniformity, that the feelings in my consciousness in the moment of voluntary choice have been preceded by facts out of my consciousness which are related to them in a uniform

manner, so that if the previous facts had been accurately known the voluntary choice might have been predicted. On the other side this is denied. To be of any use in the controversy, then, the immediate deliverance of my consciousness must be competent to assure me of the non-existence of something which by hypothesis is not in my consciousness. Given an absolutely dark room, can my sense of sight assure me that there is no one but myself in it? Can my sense of hearing assure me that nothing inaudible is going on? As little can the immediate deliverance of my consciousness assure me that the uniformity of nature does not apply to human actions.

It is perhaps necessary, in connexion with this question, to refer to that singular Materialism of high authority and recent date which makes consciousness a physical agent, 'correlates' it with Light and Nerve-force, and so reduces it to an objective phenomenon. This doctrine is founded on a common and very useful mode of speech, in which we say, for example, that a good fire is a source of pleasure on a cold day, and that a man's feeling of chill may make him run to it. But so also we say that the sun rises and sets every morning and night, although the man in the moon sees clearly that this is due to the rotation of the earth. One cannot be pedantic all day. But if we choose for once to be pedantic, the matter is after all very simple. Suppose that I am made to run by feeling a chill. When I begin to move my leg, I may observe if I like a double series of facts. I have the feeling of effort, the sensation of motion in my leg; I feel the pressure of my foot on the ground. Along with this I may see

with my eyes, or feel with my hands, the motion of my leg as a material object. The first series of facts belongs to me alone; the second may be equally observed by anybody else. The mental series began first; I willed to move my leg before I saw it move. But when I know more about the matter, I can trace the material series further back, and find nerve-messages going to the muscles of my leg to make it move. But I had a feeling of chill before I chose to move my leg. Accordingly, I can find nerve-messages, excited by the contraction due to the low temperature, going to my brain from the chilled skin. Assuming the uniformity of nature, I carry forward and backward both the mental and the material series. A uniformity is observed in each, and a parallelism is observed between them, whenever observations can be made. But sometimes one series is known better, and sometimes the other; so that in telling a story we quite naturally speak sometimes of mental facts and sometimes of material facts. A feeling of chill made a man run; strictly speaking, the nervous disturbance which coexisted with that feeling of chill made him run, if we want to talk about material facts; or the feeling of chill produced the form of sub-consciousness which coexists with the motion of legs, if we want to talk about mental facts. But we know nothing about the special nervous disturbance which coexists with a feeling of chill, because it has not yet been localized in the brain; and we know nothing about the form of sub-consciousness which coexists with the motion of legs; although there is very good reason for believing in the existence of both. So we talk about the feeling of chill and the

running, because in one case we know the mental side, and in the other the material side. A man might show me a picture of the battle of Gravelotte, and say, 'You can't see the battle, because it's all over, but there is a picture of it.' And then he might put a chassepot into my hand, and say, 'We could not represent the whole construction of a chassepot in the picture, but you can examine this one, and find it out.' If I now insisted on mixing up the two modes of communication of knowledge, if I expected that the chassepots in the picture would go off, and said that the one in my hand was painted on heavy canvas, I should be acting exactly in the spirit of the new materialism. For the material facts are a representation or symbol of the mental facts, just as a picture is a representation or symbol of a battle. And my own mind is a reality from which I can judge by analogy of the realities represented by other men's brains, just as the chassepot in my hand is a reality from which I can judge by analogy of the chassepots represented in the picture. When, therefore, we ask, 'What is the physical link between the ingoing message from chilled skin and the outgoing message which moves the leg?' and the answer is, 'A man's Will,' we have as much right to be amused as if we had asked our friend with the picture what pigment was used in painting the cannon in the foreground, and received the answer, 'Wrought iron.' It will be found excellent practice in the mental operations required by this doctrine to imagine a train, the fore part of which is an engine and three carriages linked with iron couplings, and the hind part three other carriages linked with iron couplings; the bond between the two parts being made

out of the sentiments of amity subsisting between the stoker and the guard.

To sum up: the uniformity of nature in human actions has been denied on the ground that it takes away responsibility, that it is contradicted by the testimony of consciousness, and that there is a physical correlation between mind and matter. We have replied that the uniformity of nature is necessary to responsibility, that it is affirmed by the testimony of consciousness whenever consciousness is competent to testify, and that matter is the phenomenon or symbol of which mind or quasi-mind is the symbolized and represented thing. We are now free to continue our inquiries on the supposition that nature is uniform.

We began by describing the moral sense of an Englishman. No doubt the description would serve very well for the more civilized nations of Europe; most closely for Germans and Dutch. But the fact that we can speak in this way discloses that there is more than one moral sense, and that what I feel to be right another man may feel to be wrong. Thus we cannot help asking whether there is any reason for preferring one moral sense to another; whether the question, 'What is right to do?' has in any one set of circumstances a single answer which can be definitely known.

Clearly, in the first rough sense of the word, this is not true. What is right for me to do now, seeing that I am here with a certain character, and a certain moral sense as part of it, is just what I feel to be right. The individual conscience is, in the moment of volition, the only possible judge of what is right; there is no conflicting claim. But if we are deliberating about

the future, we know that we can modify our conscience gradually by associating with people, reading certain books, and paying attention to certain ideas and feelings; and we may ask ourselves, 'How shall we modify our conscience, if at all? what kind of conscience shall we try to get? what is the *best* conscience?' We may ask similar questions about our sense of taste. There is no doubt at present that the nicest things to me are the things I like; but I know that I can train myself to like some things and dislike others, and that things which are very nasty at one time may come to be great delicacies at another. I may ask, 'How shall I train myself? What is the *best* taste?' And this leads very naturally to putting the question in another form, namely, 'What is taste good for? What is the *purpose* or *function* of taste?' We should probably find as the answer to that question that the purpose or function of taste is to discriminate wholesome food from unwholesome; that it is a matter of stomach and digestion. It will follow from this that the best taste is that which prefers wholesome food, and that by cultivating a preference for wholesome and nutritious things I shall be training my palate in the way it should go. In just the same way our question about the best conscience will resolve itself into a question about the purpose or function of the conscience—why we have got it, and what it is good for.

Now to my mind the simplest and clearest and most profound philosophy that was ever written upon this subject is to be found in the 2nd and 3rd chapters of Mr. Darwin's 'Descent of Man.' In these chapters it appears that just as most physical characteristics of

organisms have been evolved and preserved because they were useful to the individual in the struggle for existence against other individuals and other species, so this particular feeling has been evolved and preserved because it is useful to the tribe or community in the struggle for existence against other tribes, and against the environment as a whole. The function of conscience is the preservation of the tribe as a tribe. And we shall rightly train our consciences if we learn to approve those actions which tend to the advantage of the community in the struggle for existence.

There are here some words, however, which require careful definition. And first the word *purpose*. A thing serves a purpose when it is adapted to some end; thus a corkscrew is adapted to the end of extracting corks from bottles, and our lungs are adapted to the end of respiration. We may say that the extraction of corks is the purpose of the corkscrew, and that respiration is the purpose of the lungs. But here we shall have used the word in two different senses. A man made the corkscrew with a purpose in his mind, and he knew and intended that it should be used for pulling out corks. But nobody made our lungs with a purpose in his mind, and intended that they should be used for breathing. The respiratory apparatus was adapted to its purpose by natural selection—namely, by the gradual preservation of better and better adaptations, and the killing off of the worse and imperfect adaptations. In using the word purpose for the result of this unconscious process of adaptation by survival of the fittest, I know that I am somewhat extending its ordinary sense, which implies consciousness. But it seems to me that

on the score of convenience there is a great deal to be said for this extension of meaning. We want a word to express the adaptation of means to an end, whether involving consciousness or not; the word purpose will do very well, and the adjective *purposive* has already been used in this sense. But if the use is admitted, we must distinguish two kinds of purpose. There is the unconscious purpose which is attained by natural selection, in which no consciousness need be concerned; and there is the conscious purpose of an intelligence which designs a thing that it may serve to do something which he desires to be done. The distinguishing mark of this second kind, design or conscious purpose, is that in the consciousness of the agent there is an image or symbol of the end which he desires, and this precedes and determines the use of the means. Thus the man who first invented a corkscrew must have previously known that corks were in bottles, and have desired to get them out. We may describe this if we like in terms of matter, and say that a purpose of the second kind implies a complex nervous system, in which there can be formed an image or symbol of the end, and that this symbol determines the use of the means. The nervous image or symbol of anything is that mode of working of part of my brain which goes on simultaneously and is correlated with my thinking of the thing.

Aristotle defines an organism as that in which the part exists for the sake of the whole. It is not that the existence of the part depends on the existence of the whole, for every whole exists only as an aggregate of parts related in a certain way; but that the shape and nature of the part are determined by the wants of the

whole. Thus the shape and nature of my foot are what they are, not for the sake of my foot itself, but for the sake of my whole body, and because it wants to move about. That which the part has to do for the whole is called its function. Thus the function of my foot is to support me, and assist in locomotion. Not all the nature of the part is necessarily for the sake of the whole: the comparative callosity of the skin of my sole is for the protection of my foot itself.

Society is an organism, and man in society is part of an organism according to this definition, in so far as some portion of the nature of man is what it is for the sake of the whole—society. Now conscience is such a portion of the nature of man, and its function is the preservation of society in the struggle for existence. We may be able to define this function more closely when we know more about the way in which conscience tends to preserve society.

Next let us endeavour to make precise the meaning of the words *community* and *society*. It is clear that at different times men may be divided into groups of greater or less extent—tribes, clans, families, nations, towns. If a certain number of clans are struggling for existence, that portion of the conscience will be developed which tends to the preservation of the clan; so, if towns or families are struggling, we shall get a moral sense adapted to the advantage of the town or the family. In this way different portions of the moral sense may be developed at different stages of progress. Now it is clear that for the purpose of the conscience the word community at any time will mean a group of that size and nature which is being selected or not

selected for survival as a whole. Selection may be going on at the same time among many different kinds of groups. And ultimately the moral sense will be composed of various portions relating to various groups, the function or purpose of each portion being the advantage of that group to which it relates in the struggle for existence. Thus we have a sense of family duty, of municipal duty, of national duty, and of duties towards all mankind.

It is to be noticed that part of the nature of a smaller group may be what it is for the sake of a larger group to which it belongs; and then we may speak of the *function* of the smaller group. Thus it appears probable that the family, in the form in which it now exists among us, is determined by the good of the nation; and we may say that the function of the family is to promote the advantage of the nation or larger society in some certain ways. But I do not think it would be right to follow Auguste Comte in speaking of the function of humanity; because humanity is obviously not a part of any larger organism for whose sake it is what it is.

Now that we have cleared up the meanings of some of our words, we are still a great way from the definite solution of our question, 'What is the best conscience? or what ought I to think right?' For we do not yet know what is for the advantage of the community in the struggle for existence. If we choose to learn by the analogy of an individual organism, we may see that no permanent or final answer can be given, because the organism grows in consequence of the struggle, and develops new wants while it is satisfying the old ones.

But at any given time it has quite enough to do to keep alive and to avoid dangers and diseases. So we may expect that the wants and even the necessities of the social organism will grow with its growth, and that it is impossible to predict what may tend in the distant future to its advantage in the struggle for existence. But still, in this vague and general statement of the functions of conscience, we shall find that we have already established a great deal.

In the first place, right is an affair of the community, and must not be referred to anything else. To go back to our analogy of taste: if I tried to persuade you that the best palate was that which preferred things pretty to look at, you might condemn me *à priori* without any experience, by merely knowing that taste is an affair of stomach and digestion—that its function is to select wholesome food. And so, if anyone tries to persuade us that the best conscience is that which thinks it right to obey the will of some individual, as a deity or a monarch, he is condemned *à priori* in the very nature of right and wrong. In order that the worship of a deity may be consistent with natural ethics, he must be regarded as the friend and helper of humanity, and his character must be judged from his actions by a moral standard which is independent of him. And this, it must be admitted, is the position which has been taken by most English divines, as long as they were Englishmen first and divines afterwards. The worship of a deity who is represented as unfair or unfriendly to any portion of the community is a wrong thing, however great may be the threats and promises by which it is commended. And still worse, the reference of right

and wrong to his arbitrary will as a standard, the diversion of the allegiance of the moral sense from the community to him, is the most insidious and fatal of social diseases. It was against this that the Teutonic conscience protested in the Reformation. Again, in monarchical countries, in order that allegiance to the sovereign may be consistent with natural ethics, he must be regarded as the servant and symbol of the national unity, capable of rebellion and punishable for it. And this has been the theory of the English constitution from time immemorial.[1]

The first principle of natural ethics, then, is the sole and supreme allegiance of conscience to the community. I venture to call this *piety* in accordance with the older meaning of the word. Even if it should turn out impossible to sever it from the unfortunate associations which have clung to its later meaning, still it seems worth while to try.

An immediate deduction from our principle is that there are no self-regarding virtues properly so called; those qualities which tend to the advantage and preservation of the individual being only morally *right* in so far as they make him a more useful citizen. And this conclusion is in some cases of great practical importance. The virtue of purity, for example, attains in this way a fairly exact definition: purity in a man is that course of conduct which makes him to be a good husband and father, in a woman that which makes her to be a good wife and mother, or which helps other people so to

[1] [Rex autem habet superiorem, Deum scilicet. Item legem per quam factus est rex. Item curiam suam . . . et ideo si rex fuerit sine fraeno, id est sine lege, debent ei fraenum ponere.—Bracton, fo. 34 *a*.]

prepare and keep themselves. It is easy to see how many false ideas and pernicious precepts are swept away by even so simple a definition as that.

Next, we may fairly define our position in regard to that moral system which has deservedly found favour with the great mass of our countrymen. In the common statement of utilitarianism the end of right action is defined to be the greatest happiness of the greatest number. It seems to me that the reason and the ample justification of the success of this system is that it explicitly sets forth the community as the object of moral allegiance. But our determination of the purpose of the conscience will oblige us to make a change in the statement of it. Happiness is not the end of right action. My happiness is of no use to the community except in so far as it makes me a more efficient citizen; that is to say, it is rightly desired as a means and not as an end. The end may be described as the greatest efficiency of all citizens as such. No doubt happiness will in the long run accrue to the community as a consequence of right conduct; but the right is determined independently of the happiness, and, as Plato says, it is better to suffer wrong than to do wrong.

In conclusion, I would add some words on the relation of Veracity to the first principle of Piety. It is clear that veracity is founded on faith in man; you tell a man the truth when you can trust him with it and are not afraid. This perhaps is made more evident by considering the case of exception allowed by all moralists—namely, that if a man asks you the way with a view to committing a murder, it is right to tell a lie and misdirect him. The reason why he must not have

the truth told him is that he would make a bad use of it; he cannot be trusted with it. About these cases of exception an important remark must be made in passing. When we hear that a man has told a lie under such circumstances, we are indeed ready to admit that for once it was right, *mensonge admirable*; but we always have a sort of feeling that it must not occur again. And the same thing applies to cases of conflicting obligations, when for example the family conscience and the national conscience disagree. In such cases no general rule can be laid down; we have to choose the less of two evils; but this is not right altogether in the same sense as it is right to speak the truth. There is something wrong in the circumstances, that we should have to choose an evil at all. The actual course to be pursued will vary with the progress of society; that evil which at first was greater will become less, and in a perfect society the conflict will be resolved into harmony. But meanwhile these cases of exception must be carefully kept distinct from the straightforward cases of right and wrong, and they always imply an obligation to mend the circumstances if we can.

Veracity to an individual is not only enjoined by piety in virtue of the obvious advantage which attends a straightforward and mutually-trusting community as compared with others, but also because deception is in all cases a personal injury. Still more is this true of veracity to the community itself. The conception of the universe or aggregate of beliefs which forms the link between sensation and action for each individual is a public and not a private matter; it is formed by society and for society. Of what enormous importance it is to

the community that this should be a true conception I need not attempt to describe. Now to the attainment of this true conception two things are necessary.

First, if we study the history of those methods by which true beliefs and false beliefs have been attained, we shall see that it is our duty to guide our beliefs by inference from experience on the assumption of uniformity of nature and consciousness in other men, *and by this only*. Only upon this moral basis can the foundations of the empirical method be justified.

Secondly, veracity to the community depends upon faith in man. Surely I ought to be talking platitudes when I say that it is not English to tell a man a lie, or to suggest a lie by your silence or your actions, because you are afraid that he is not prepared for the truth, because you don't quite know what he will do when he knows it, because perhaps after all this lie is a better thing for him than the truth would be, this same man being all the time an honest fellow-citizen whom you have every reason to trust. Surely I have heard that this craven crookedness is the object of our national detestation. And yet it is constantly whispered that it would be dangerous to divulge certain truths to the masses. 'I know the whole thing is untrue: but then it is so useful for the people; you don't know what harm you might do by shaking their faith in it.' Crooked ways are none the less crooked because they are meant to deceive great masses of people instead of individuals. If a thing is true, let us all believe it, rich and poor, men, women, and children. If a thing is untrue, let us all disbelieve it, rich and poor, men, women, and children. Truth is a thing to be shouted from the

housetops, not to be whispered over rose-water after dinner when the ladies are gone away.

Even in those whom I would most reverence, who would shrink with horror from such actual deception as I have just mentioned, I find traces of a want of faith in man. Even that noble thinker, to whom we of this generation owe more than I can tell, seemed to say in one of his posthumous essays that in regard to questions of great public importance we might encourage a hope in excess of the evidence (which would infallibly grow into a belief and defy evidence) if we found that life was made easier by it. As if we should not lose infinitely more by nourishing a tendency to falsehood than we could gain by the delusion of a pleasing fancy. Life must first of all be made straight and true; it may get easier through the help this brings to the commonwealth. And the great historian of materialism [1] says that the amount of false belief necessary to morality in a given society is a matter of taste. I cannot believe that any falsehood whatever is necessary to morality. It cannot be true of my race and yours that to keep ourselves from becoming scoundrels we must needs believe a lie. The sense of right grew up among healthy men and was fixed by the practice of comradeship. It has never had help from phantoms and falsehoods, and it never can want any. By faith in man and piety towards men we have taught each other the right hitherto; with faith in man and piety towards men we shall never more depart from it.

[1] Lange, 'Geschichte des Materialismus.'

THE ETHICS OF BELIEF.[1]

I.—The Duty of Inquiry.

A SHIPOWNER was about to send to sea an emigrant-ship. He knew that she was old, and not over-well built at the first; that she had seen many seas and climes, and often had needed repairs. Doubts had been suggested to him that possibly she was not seaworthy. These doubts preyed upon his mind, and made him unhappy; he thought that perhaps he ought to have her thoroughly overhauled and refitted, even though this should put him to great expense. Before the ship sailed, however, he succeeded in overcoming these melancholy reflections. He said to himself that she had gone safely through so many voyages and weathered so many storms that it was idle to suppose she would not come safely home from this trip also. He would put his trust in Providence, which could hardly fail to protect all these unhappy families that were leaving their fatherland to seek for better times elsewhere. He would dismiss from his mind all ungenerous suspicions about the honesty of builders and contractors. In such ways he acquired a sincere and comfortable conviction that his vessel was thoroughly safe and seaworthy; he watched her departure with a light heart, and benevolent wishes for the success of the exiles in their strange

[1] *Contemporary Review*, January, 1877.

new home that was to be; and he got his insurance-money when she went down in mid-ocean and told no tales.

What shall we say of him? Surely this, that he was verily guilty of the death of those men. It is admitted that he did sincerely believe in the soundness of his ship; but the sincerity of his conviction can in no wise help him, because *he had no right to believe on such evidence as was before him.* He had acquired his belief not by honestly earning it in patient investigation, but by stifling his doubts. And although in the end he may have felt so sure about it that he could not think otherwise, yet inasmuch as he had knowingly and willingly worked himself into that frame of mind, he must be held responsible for it.

Let us alter the case a little, and suppose that the ship was not unsound after all; that she made her voyage safely, and many others after it. Will that diminish the guilt of her owner? Not one jot. When an action is once done, it is right or wrong for ever; no accidental failure of its good or evil fruits can possibly alter that. The man would not have been innocent, he would only have been not found out. The question of right or wrong has to do with the origin of his belief, not the matter of it; not what it was, but how he got it; not whether it turned out to be true or false, but whether he had a right to believe on such evidence as was before him.

There was once an island in which some of the inhabitants professed a religion teaching neither the doctrine of original sin nor that of eternal punishment. A suspicion got abroad that the professors of this

religion had made use of unfair means to get their doctrines taught to children. They were accused of wresting the laws of their country in such a way as to remove children from the care of their natural and legal guardians; and even of stealing them away and keeping them concealed from their friends and relations. A certain number of men formed themselves into a society for the purpose of agitating the public about this matter. They published grave accusations against individual citizens of the highest position and character, and did all in their power to injure these citizens in the exercise of their professions. So great was the noise they made, that a Commission was appointed to investigate the facts; but after the Commission had carefully inquired into all the evidence that could be got, it appeared that the accused were innocent. Not only had they been accused on insufficient evidence, but the evidence of their innocence was such as the agitators might easily have obtained, if they had attempted a fair inquiry. After these disclosures the inhabitants of that country looked upon the members of the agitating society, not only as persons whose judgment was to be distrusted, but also as no longer to be counted honourable men. For although they had sincerely and conscientiously believed in the charges they had made, yet *they had no right to believe on such evidence as was before them.* Their sincere convictions, instead of being honestly earned by patient inquiring, were stolen by listening to the voice of prejudice and passion.

Let us vary this case also, and suppose, other things remaining as before, that a still more accurate investigation proved the accused to have been really guilty.

Would this make any difference in the guilt of the accusers? Clearly not; the question is not whether their belief was true or false, but whether they entertained it on wrong grounds. They would no doubt say, 'Now you see that we were right after all; next time perhaps you will believe us.' And they might be believed, but they would not thereby become honourable men. They would not be innocent, they would only be not found out. Every one of them, if he chose to examine himself *in foro conscientiæ*, would know that he had acquired and nourished a belief, when he had no right to believe on such evidence as was before him; and therein he would know that he had done a wrong thing.

It may be said, however, that in both of these supposed cases it is not the belief which is judged to be wrong, but the action following upon it. The shipowner might say, 'I am perfectly certain that my ship is sound, but still I feel it my duty to have her examined, before trusting the lives of so many people to her.' And it might be said to the agitator, 'However convinced you were of the justice of your cause and the truth of your convictions, you ought not to have made a public attack upon any man's character until you had examined the evidence on both sides with the utmost patience and care.'

In the first place, let us admit that, so far as it goes, this view of the case is right and necessary; right, because even when a man's belief is so fixed that he cannot think otherwise, he still has a choice in regard to the action suggested by it, and so cannot escape the duty of investigating on the ground of the strength

of his convictions; and necessary, because those who are not yet capable of controlling their feelings and thoughts must have a plain rule dealing with overt acts.

But this being premised as necessary, it becomes clear that it is not sufficient, and that our previous judgment is required to supplement it. For it is not possible so to sever the belief from the action it suggests as to condemn the one without condemning the other. No man holding a strong belief on one side of a question, or even wishing to hold a belief on one side, can investigate it with such fairness and completeness as if he were really in doubt and unbiassed; so that the existence of a belief not founded on fair inquiry unfits a man for the performance of this necessary duty.

Nor is that truly a belief at all which has not some influence upon the actions of him who holds it. He who truly believes that which prompts him to an action has looked upon the action to lust after it, he has committed it already in his heart. If a belief is not realized immediately in open deeds, it is stored up for the guidance of the future. It goes to make a part of that aggregate of beliefs which is the link between sensation and action at every moment of all our lives, and which is so organized and compacted together that no part of it can be isolated from the rest, but every new addition modifies the structure of the whole. No real belief, however trifling and fragmentary it may seem, is ever truly insignificant; it prepares us to receive more of its like, confirms those which resembled it before, and weakens others; and so gradually it lays

a stealthy train in our inmost thoughts, which may some day explode into overt action, and leave its stamp upon our character for ever.

And no one man's belief is in any case a private matter which concerns himself alone. Our lives are guided by that general conception of the course of things which has been created by society for social purposes. Our words, our phrases, our forms and processes and modes of thought, are common property, fashioned and perfected from age to age; an heirloom which every succeeding generation inherits as a precious deposit and a sacred trust to be handed on to the next one, not unchanged but enlarged and purified, with some clear marks of its proper handiwork. Into this, for good or ill, is woven every belief of every man who has speech of his fellows. An awful privilege, and an awful responsibility, that we should help to create the world in which posterity will live.

In the two supposed cases which have been considered, it has been judged wrong to believe on insufficient evidence, or to nourish belief by suppressing doubts and avoiding investigation. The reason of this judgment is not far to seek: it is that in both these cases the belief held by one man was of great importance to other men. But forasmuch as no belief held by one man, however seemingly trivial the belief, and however obscure the believer, is ever actually insignificant or without its effect on the fate of mankind, we have no choice but to extend our judgment to all cases of belief whatever. Belief, that sacred faculty which prompts the decisions of our will, and knits into harmonious working all the compacted energies

of our being, is ours not for ourselves, but for humanity. It is rightly used on truths which have been established by long experience and waiting toil, and which have stood in the fierce light of free and fearless questioning. Then it helps to bind men together, and to strengthen and direct their common action. It is desecrated when given to unproved and unquestioned statements, for the solace and private pleasure of the believer; to add a tinsel splendour to the plain straight road of our life and display a bright mirage beyond it; or even to drown the common sorrows of our kind by a self-deception which allows them not only to cast down, but also to degrade us. Whoso would deserve well of his fellows in this matter will guard the purity of his belief with a very fanaticism of jealous care, lest at any time it should rest on an unworthy object, and catch a stain which can never be wiped away.

It is not only the leader of men, statesman, philosopher, or poet, that owes this bounden duty to mankind. Every rustic who delivers in the village alehouse his slow, infrequent sentences, may help to kill or keep alive the fatal superstitions which clog his race. Every hard-worked wife of an artisan may transmit to her children beliefs which shall knit society together, or rend it in pieces. No simplicity of mind, no obscurity of station, can escape the universal duty of questioning all that we believe.

It is true that this duty is a hard one, and the doubt which comes out of it is often a very bitter thing. It leaves us bare and powerless where we thought that we were safe and strong. To know all about anything is to know how to deal with it under all circumstances.

We feel much happier and more secure when we think we know precisely what to do, no matter what happens, than when we have lost our way and do not know where to turn. And if we have supposed ourselves to know all about anything, and to be capable of doing what is fit in regard to it, we naturally do not like to find that we are really ignorant and powerless, that we have to begin again at the beginning, and try to learn what the thing is and how it is to be dealt with—if indeed anything can be learnt about it. It is the sense of power attached to a sense of knowledge that makes men desirous of believing, and afraid of doubting.

This sense of power is the highest and best of pleasures when the belief on which it is founded is a true belief, and has been fairly earned by investigation. For then we may justly feel that it is common property, and holds good for others as well as for ourselves. Then we may be glad, not that *I* have learned secrets by which I am safer and stronger, but that *we men* have got mastery over more of the world; and we shall be strong, not for ourselves, but in the name of Man and in his strength. But if the belief has been accepted on insufficient evidence, the pleasure is a stolen one. Not only does it deceive ourselves by giving us a sense of power which we do not really possess, but it is sinful, because it is stolen in defiance of our duty to mankind. That duty is to guard ourselves from such beliefs as from a pestilence, which may shortly master our own body and then spread to the rest of the town. What would be thought of one who, for the sake of a sweet fruit, should deliberately run the risk of bringing a plague upon his family and his neighbours?

And, as in other such cases, it is not the risk only which has to be considered; for a bad action is always bad at the time when it is done, no matter what happens afterwards. Every time we let ourselves believe for unworthy reasons, we weaken our powers of self-control, of doubting, of judicially and fairly weighing evidence. We all suffer severely enough from the maintenance and support of false beliefs and the fatally wrong actions which they lead to, and the evil born when one such belief is entertained is great and wide. But a greater and wider evil arises when the credulous character is maintained and supported, when a habit of believing for unworthy reasons is fostered and made permanent. If I steal money from any person, there may be no harm done by the mere transfer of possession; he may not feel the loss, or it may prevent him from using the money badly. But I cannot help doing this great wrong towards Man, that I make myself dishonest. What hurts society is not that it should lose its property, but that it should become a den of thieves; for then it must cease to be society. This is why we ought not to do evil that good may come; for at any rate this great evil has come, that we have done evil and are made wicked thereby. In like manner, if I let myself believe anything on insufficient evidence, there may be no great harm done by the mere belief; it may be true after all, or I may never have occasion to exhibit it in outward acts. But I cannot help doing this great wrong towards Man, that I make myself credulous. The danger to society is not merely that it should believe wrong things, though that is great enough; but that it should become credulous, and lose the habit of testing things and

inquiring into them; for then it must sink back into savagery.

The harm which is done by credulity in a man is not confined to the fostering of a credulous character in others, and consequent support of false beliefs. Habitual want of care about what I believe leads to habitual want of care in others about the truth of what is told to me. Men speak the truth to one another when each reveres the truth in his own mind and in the other's mind; but how shall my friend revere the truth in my mind when I myself am careless about it, when I believe things because I want to believe them, and because they are comforting and pleasant? Will he not learn to cry, 'Peace,' to me, when there is no peace? By such a course I shall surround myself with a thick atmosphere of falsehood and fraud, and in that I must live. It may matter little to me, in my cloud-castle of sweet illusions and darling lies; but it matters much to Man that I have made my neighbours ready to deceive. The credulous man is father to the liar and the cheat; he lives in the bosom of this his family, and it is no marvel if he should become even as they are. So closely are our duties knit together, that whoso shall keep the whole law, and yet offend in one point, he is guilty of all.

To sum up: it is wrong always, everywhere, and for anyone, to believe anything upon insufficient evidence.

If a man, holding a belief which he was taught in childhood or persuaded of afterwards, keeps down and pushes away any doubts which arise about it in his mind, purposely avoids the reading of books and the

company of men that call in question or discuss it, and regards as impious those questions which cannot easily be asked without disturbing it—the life of that man is one long sin against mankind.

If this judgment seems harsh when applied to those simple souls who have never known better, who have been brought up from the cradle with a horror of doubt, and taught that their eternal welfare depends on *what* they believe, then it leads to the very serious question, *Who hath made Israel to sin?*

It may be permitted me to fortify this judgment with the sentence of Milton [1]—

'A man may be a heretic in the truth; and if he believe things only because his pastor says so, or the assembly so determine, without knowing other reason, though his belief be true, yet the very truth he holds becomes his heresy.'

And with this famous aphorism of Coleridge [2]—

'He who begins by loving Christianity better than Truth, will proceed by loving his own sect or Church better than Christianity, and end in loving himself better than all.'

Inquiry into the evidence of a doctrine is not to be made once for all, and then taken as finally settled. It is never lawful to stifle a doubt; for either it can be honestly answered by means of the inquiry already made, or else it proves that the inquiry was not complete.

'But,' says one, 'I am a busy man; I have no time for the long course of study which would be necessary to make me in any degree a competent judge of certain

[1] *Areopagitica.* [2] *Aids to Reflection.*

questions, or even able to understand the nature of the arguments.' Then he should have no time to believe.

II.—The Weight of Authority.

Are we then to become universal sceptics, doubting everything, afraid always to put one foot before the other until we have personally tested the firmness of the road? Are we to deprive ourselves of the help and guidance of that vast body of knowledge which is daily growing upon the world, because neither we nor any other one person can possibly test a hundredth part of it by immediate experiment or observation, and because it would not be completely proved if we did? Shall we steal and tell lies because we have had no personal experience wide enough to justify the belief that it is wrong to do so?

There is no practical danger that such consequences will ever follow from scrupulous care and self-control in the matter of belief. Those men who have most nearly done their duty in this respect have found that certain great principles, and these most fitted for the guidance of life, have stood out more and more clearly in proportion to the care and honesty with which they were tested, and have acquired in this way a practical certainty. The beliefs about right and wrong which guide our actions in dealing with men in society, and the beliefs about physical nature which guide our actions in dealing with animate and inanimate bodies, these never suffer from investigation; they can take care of themselves, without being propped up by

'acts of faith,' the clamour of paid advocates, or the suppression of contrary evidence. Moreover there are many cases in which it is our duty to act upon probabilities, although the evidence is not such as to justify present belief; because it is precisely by such action, and by observation of its fruits, that evidence is got which may justify future belief. So that we have no reason to fear lest a habit of conscientious inquiry should paralyse the actions of our daily life.

But because it is not enough to say, 'It is wrong to believe on unworthy evidence,' without saying also what evidence is worthy, we shall now go on to inquire under what circumstances it is lawful to believe on the testimony of others; and then, further, we shall inquire more generally when and why we may believe that which goes beyond our own experience, or even beyond the experience of mankind.

In what cases, then, let us ask in the first place, is the testimony of a man unworthy of belief? He may say that which is untrue either knowingly or unknowingly. In the first case he is lying, and his moral character is to blame; in the second case he is ignorant or mistaken, and it is only his knowledge or his judgment which is in fault. In order that we may have the right to accept his testimony as ground for believing what he says, we must have reasonable grounds for trusting his *veracity*, that he is really trying to speak the truth so far as he knows it; his *knowledge*, that he has had opportunities of knowing the truth about this matter; and his *judgment*, that he has made proper use of those opportunities in coming to the conclusion which he affirms.

However plain and obvious these reasons may be, so that no man of ordinary intelligence, reflecting upon the matter, could fail to arrive at them, it is nevertheless true that a great many persons do habitually disregard them in weighing testimony. Of the two questions, equally important to the trustworthiness of a witness, 'Is he dishonest?' and 'May he be mistaken?' the majority of mankind are perfectly satisfied if *one* can, with some show of probability, be answered in the negative. The excellent moral character of a man is alleged as ground for accepting his statements about things which he cannot possibly have known. A Mohammedan, for example, will tell us that the character of his Prophet was so noble and majestic that it commands the reverence even of those who do not believe in his mission. So admirable was his moral teaching, so wisely put together the great social machine which he created, that his precepts have not only been accepted by a great portion of mankind, but have actually been obeyed. His institutions have on the one hand rescued the negro from savagery, and on the other hand have taught civilization to the advancing West; and although the races which held the highest forms of his faith, and most fully embodied his mind and thought, have all been conquered and swept away by barbaric tribes, yet the history of their marvellous attainments remains as an imperishable glory to Islam. Are we to doubt the word of a man so great and so good? Can we suppose that this magnificent genius, this splendid moral hero, has lied to us about the most solemn and sacred matters? The testimony of Mohammed is clear, that there is but one God, and that he, Mohammed, is his

prophet; that if we believe in him we shall enjoy everlasting felicity, but that if we do not we shall be damned. This testimony rests on the most awful of foundations, the revelation of heaven itself; for was he not visited by the angel Gabriel, as he fasted and prayed in his desert cave, and allowed to enter into the blessed fields of Paradise? Surely God is God and Mohammed is the Prophet of God.

What should we answer to this Mussulman? First, no doubt, we should be tempted to take exception against his view of the character of the Prophet and the uniformly beneficial influence of Islam: before we could go with him altogether in these matters it might seem that we should have to forget many terrible things of which we have heard or read. But if we chose to grant him all these assumptions, for the sake of argument, and because it is difficult both for the faithful and for infidels to discuss them fairly and without passion, still we should have something to say which takes away the ground of his belief, and therefore shows that it is wrong to entertain it. Namely this: the character of Mohammed is excellent evidence that he was honest and spoke the truth so far as he knew it; but it is no evidence at all that he knew what the truth was. What means could he have of knowing that the form which appeared to him to be the angel Gabriel was not a hallucination, and that his apparent visit to Paradise was not a dream? Grant that he himself was fully persuaded and honestly believed that he had the guidance of heaven, and was the vehicle of a supernatural revelation, how could he know that this strong conviction was not a mistake? Let us put ourselves in his place;

we shall find that the more completely we endeavour to realize what passed through his mind, the more clearly we shall perceive that the Prophet could have had no adequate ground for the belief in his own inspiration. It is most probable that he himself never doubted of the matter, or thought of asking the question; but we are in the position of those to whom the question has been asked, and who are bound to answer it. It is known to medical observers that solitude and want of food are powerful means of producing delusion and of fostering a tendency to mental disease. Let us suppose, then, that I, like Mohammed, go into desert places to fast and pray; what things can happen to me which will give me the right to believe that I am divinely inspired? Suppose that I get information, apparently from a celestial visitor, which upon being tested is found to be correct. I cannot be sure, in the first place, that the celestial visitor is not a figment of my own mind, and that the information did not come to me, unknown at the time to my consciousness, through some subtle channel of sense. But if my visitor were a real visitor, and for a long time gave me information which was found to be trustworthy, this would indeed be good ground for trusting him in the future as to such matters as fall within human powers of verification; but it would not be ground for trusting his testimony as to any other matters. For although his tested character would justify me in believing that he spoke the truth so far as he knew, yet the same question would present itself—what ground is there for supposing that he knows?

Even if my supposed visitor had given me such information, subsequently verified by me, as proved him

to have means of knowledge about verifiable matters far exceeding my own; this would not justify me in believing what he said about matters that are not at present capable of verification by man. It would be ground for interesting conjecture, and for the hope that, as the fruit of our patient inquiry, we might by-and-by attain to such a means of verification as should rightly turn conjecture into belief. For belief belongs to man, and to the guidance of human affairs: no belief is real unless it guide our actions, and those very actions supply a test of its truth.

But, it may be replied, the acceptance of Islam as a system is just that action which is prompted by belief in the mission of the Prophet, and which will serve for a test of its truth. Is it possible to believe that a system which has succeeded so well is really founded upon a delusion? Not only have individual saints found joy and peace in believing, and verified those spiritual experiences which are promised to the faithful, but nations also have been raised from savagery or barbarism to a higher social state. Surely we are at liberty to say that the belief has been acted upon, and that it has been verified.

It requires, however, but little consideration to show that what has really been verified is not at all the supernal character of the Prophet's mission, or the trustworthiness of his authority in matters which we ourselves cannot test, but only his practical wisdom in certain very mundane things. The fact that believers have found joy and peace in believing gives us the right to say that the doctrine is a comfortable doctrine, and pleasant to the soul; but it does not give us the right to say that

it is true. And the question which our conscience is always asking about that which we are tempted to believe is not, 'Is it comfortable and pleasant?' but, 'Is it true?' That the Prophet preached certain doctrines, and predicted that spiritual comfort would be found in them, proves only his sympathy with human nature and his knowledge of it; but it does not prove his superhuman knowledge of theology.

And if we admit for the sake of argument (for it seems that we cannot do more) that the progress made by Moslem nations in certain cases was really due to the system formed and sent forth into the world by Mohammed, we are not at liberty to conclude from this that he was inspired to declare the truth about things which we cannot verify. We are only at liberty to infer the excellence of his moral precepts, or of the means which he devised for so working upon men as so get them obeyed, or of the social and political machinery which he set up. And it would require a great amount of careful examination into the history of those nations to determine which of these things had the greater share in the result. So that here again it is the Prophet's knowledge of human nature, and his sympathy with it, that are verified; not his divine inspiration, or his knowledge of theology.

If there were only one Prophet, indeed, it might well seem a difficult and even an ungracious task to decide upon what points we would trust him, and on what we would doubt his authority; seeing what help and furtherance all men have gained in all ages from those who saw more clearly, who felt more strongly, and who sought the truth with more single heart than their

weaker brethren. But there is not only one Prophet; and while the consent of many upon that which, as men, they had real means of knowing and did know, has endured to the end, and been honourably built into the great fabric of human knowledge, the diverse witness of some about that which they did not and could not know remains as a warning to us that to exaggerate the prophetic authority is to misuse it, and to dishonour those who have sought only to help and further us after their power. It is hardly in human nature that a man should quite accurately gauge the limits of his own insight; but it is the duty of those who profit by his work to consider carefully where he may have been carried beyond it. If we must needs embalm his possible errors along with his solid achievements, and use his authority as an excuse for believing what he cannot have known, we make of his goodness an occasion to sin.

To consider only one other such witness: the followers of the Buddha have at least as much right to appeal to individual and social experience in support of the authority of the Eastern saviour. The special mark of his religion, it is said, that in which it has never been surpassed, is the comfort and consolation which it gives to the sick and sorrowful, the tender sympathy with which it soothes and assuages all the natural griefs of men. And surely no triumph of social morality can be greater or nobler than that which has kept nearly half the human race from persecuting in the name of religion. If we are to trust the accounts of his early followers, he believed himself to have come upon earth with a divine and cosmic mission to set rolling the wheel of the law.

Being a prince, he divested himself of his kingdom, and of his free will became acquainted with misery, that he might learn how to meet and subdue it. Could such a man speak falsely about solemn things? And as for his knowledge, was he not a man miraculous with powers more than man's? He was born of woman without the help of man; he rose into the air and was transfigured before his kinsmen; at last he went up bodily into heaven from the top of Adam's Peak. Is not his word to be believed in when he testifies of heavenly things?

If there were only he, and no other, with such claims! But there is Mohammed with his testimony; we cannot choose but listen to them both. The Prophet tells us that there is one God, and that we shall live for ever in joy or misery, according as we believe in the Prophet or not. The Buddha says that there is no God, and that we shall be annihilated by-and-by if we are good enough. Both cannot be infallibly inspired; one or the other must have been the victim of a delusion, and thought he knew that which he really did not know. Who shall dare to say which? and how can we justify ourselves in believing that the other was not also deluded?

We are led, then, to these judgments following. The goodness and greatness of a man do not justify us in accepting a belief upon the warrant of his authority, unless there are reasonable grounds for supposing that he knew the truth of what he was saying. And there can be no grounds for supposing that a man knows that which we, without ceasing to be men, could not be supposed to verify.

If a chemist tells me, who am no chemist, that a

certain substance can be made by putting together other substances in certain proportions and subjecting them to a known process, I am quite justified in believing this upon his authority, unless I know anything against his character or his judgment. For his professional training is one which tends to encourage veracity and the honest pursuit of truth, and to produce a dislike of hasty conclusions and slovenly investigation. And I have reasonable ground for supposing that he knows the truth of what he is saying, for although I am no chemist, I can be made to understand so much of the methods and processes of the science as makes it conceivable to me that, without ceasing to be man, I might verify the statement. I may never actually verify it, or even see any experiment which goes towards verifying it; but still I have quite reason enough to justify me in believing that the verification is within the reach of human appliances and powers, and in particular that it has been actually performed by my informant. His result, the belief to which he has been led by his inquiries, is valid not only for himself but for others; it is watched and tested by those who are working in the same ground, and who know that no greater service can be rendered to science than the purification of accepted results from the errors which may have crept into them. It is in this way that the result becomes common property, a right object of belief, which is a social affair and matter of public business. Thus it is to be observed that his authority is valid because there are those who question it and verify it; that it is precisely this process of examining and purifying that keeps alive among investigators the love of that which shall

stand all possible tests, the sense of public responsibility as of those whose work, if well done, shall remain as the enduring heritage of mankind.

But if my chemist tells me that an atom of oxygen has existed unaltered in weight and rate of vibration throughout all time, I have no right to believe this on his authority, for it is a thing which he cannot know without ceasing to be man. He may quite honestly believe that this statement is a fair inference from his experiments, but in that case his judgment is at fault. A very simple consideration of the character of experiments would show him that they never can lead to results of such a kind; that being themselves only approximate and limited, they cannot give us knowledge which is exact and universal. No eminence of character and genius can give a man authority enough to justify us in believing him when he makes statements implying exact or universal knowledge.

Again, an Arctic explorer may tell us that in a given latitude and longitude he has experienced such and such a degree of cold, that the sea was of such a depth, and the ice of such a character. We should be quite right to believe him, in the absence of any stain upon his veracity. It is conceivable that we might, without ceasing to be men, go there and verify his statement; it can be tested by the witness of his companions, and there is adequate ground for supposing that he knows the truth of what he is saying. But if an old whaler tells us that the ice is three hundred feet thick all the way up to the Pole, we shall not be justified in believing him. 'For although the statement may be capable of verification by man, it is certainly not capable of

verification by *him*, with any means and appliances which he has possessed; and he must have persuaded himself of the truth of it by some means which does not attach any credit to his testimony. Even if, therefore, the matter affirmed is within the reach of human knowledge, we have no right to accept it upon authority unless it is within the reach of our informant's knowledge.

What shall we say of that authority, more venerable and august than any individual witness, the time-honoured tradition of the human race? An atmosphere of beliefs and conceptions has been formed by the labours and struggles of our forefathers, which enables us to breathe amid the various and complex circumstances of our life. It is around and about us and within us; we cannot think except in the forms and processes of thought which it supplies. Is it possible to doubt and to test it? and if possible, is it right?

We shall find reason to answer that it is not only possible and right, but our bounden duty; that the main purpose of the tradition itself is to supply us with the means of asking questions, of testing and inquiring into things; that if we misuse it, and take it as a collection of cut-and-dried statements, to be accepted without further inquiry, we are not only injuring ourselves here, but by refusing to do our part towards the building up of the fabric which shall be inherited by our children, we are tending to cut off ourselves and our race from the human line.

Let us first take care to distinguish a kind of tradition which especially requires to be examined and called

in question, because it especially shrinks from inquiry. Suppose that a medicine-man in Central Africa tells his tribe that a certain powerful medicine in his tent will be propitiated if they kill their cattle; and that the tribe believe him. Whether the medicine was propitiated or not, there are no means of verifying, but the cattle are gone. Still the belief may be kept up in the tribe that propitiation has been effected in this way; and in a later generation it will be all the easier for another medicine-man to persuade them to a similar act. Here the only reason for belief is that everybody has believed the thing for so long that it must be true. And yet the belief was founded on fraud, and has been propagated by credulity. That man will undoubtedly do right, and be a friend of men, who shall call it in question and see that there is no evidence for it, help his neighbours to see as he does, and even, if need be, go into the holy tent and break the medicine.

The rule which should guide us in such cases is simple and obvious enough: that the aggregate testimony of our neighbours is subject to the same conditions as the testimony of any one of them. Namely, we have no right to believe a thing true because everybody says so, unless there are good grounds for believing that some one person at least has the means of knowing what is true, and is speaking the truth so far as he knows it. However many nations and generations of men are brought into the witness-box, they cannot testify to anything which they do not know. Every man who has accepted the statement from somebody else, without himself testing and verifying it, is out of court; his word is worth nothing at all. And when we

get back at last to the true birth and beginning of the statement, two serious questions must be disposed of in regard to him who first made it: was he mistaken in thinking that he *knew* about this matter, or was he lying?

This last question is unfortunately a very actual and practical one even to us at this day and in this country. We have no occasion to go to La Salette, or to Central Africa, or to Lourdes, for examples of immoral and debasing superstition. It is only too possible for a child to grow up in London surrounded by an atmosphere of beliefs fit only for the savage, which have in our own time been founded in fraud and propagated by credulity.

Laying aside, then, such tradition as is handed on without testing by successive generations, let us consider that which is truly built up out of the common experience of mankind. This great fabric is for the guidance of our thoughts, and through them of our actions, both in the moral and in the material world. In the moral world, for example, it gives us the conceptions of right in general, of justice, of truth, of beneficence, and the like. These are given as conceptions, not as statements or propositions; they answer to certain definite instincts, which are certainly within us, however they came there. That it is right to be beneficent is matter of immediate personal experience; for when a man retires within himself and there finds something, wider and more lasting than his solitary personality, which says, 'I want to do right,' as well as, 'I want to do good to man,' he can verify by direct observation that one instinct is founded upon and agrees fully with the other.

And it is his duty so to verify this and all similar statements.

The tradition says also, at a definite place and time, that such and such actions are just, or true, or beneficent. For all such rules a further inquiry is necessary, since they are sometimes established by an authority other than that of the moral sense founded on experience. Until recently, the moral tradition of our own country—and indeed of all Europe—taught that it was beneficent to give money indiscriminately to beggars. But the questioning of this rule, and investigation into it, led men to see that true beneficence is that which helps a man to do the work which he is most fitted for, not that which keeps and encourages him in idleness; and that to neglect this distinction in the present is to prepare pauperism and misery for the future. By this testing and discussion, not only has practice been purified and made more beneficent, but the very conception of beneficence has been made wider and wiser. Now here the great social heirloom consists of two parts: the instinct of beneficence, which makes a certain side of our nature, when predominant, wish to do good to men; and the intellectual conception of beneficence, which we can compare with any proposed course of conduct and ask, 'Is this beneficent or not?' By the continual asking and answering of such questions the conception grows in breadth and distinctness, and the instinct becomes strengthened and purified. It appears then that the great use of the conception, the intellectual part of the heirloom, is to enable us to ask questions; that it grows and is kept straight by means of these questions; and if we do not use it for that purpose we shall gradu-

ally lose it altogether, and be left with a mere code of regulations which cannot rightly be called morality at all.

Such considerations apply even more obviously and clearly, if possible, to the store of beliefs and conceptions which our fathers have amassed for us in respect of the material world. We are ready to laugh at the rule of thumb of the Australian, who continues to tie his hatchet to the side of the handle, although the Birmingham fitter has made a hole on purpose for him to put the handle in. His people have tied up hatchets so for ages: who is he that he should set himself up against their wisdom? He has sunk so low that he cannot do what some of them must have done in the far distant past—call in question an established usage, and invent or learn something better. Yet here, in the dim beginning of knowledge, where science and art are one, we find only the same simple rule which applies to the highest and deepest growths of that cosmic Tree; to its loftiest flower-tipped branches as well as to the profoundest of its hidden roots; the rule, namely, that what is stored up and handed down to us is rightly used by those who act as the makers acted, when they stored it up; those who use it to ask further questions, to examine, to investigate; who try honestly and solemnly to find out what is the right way of looking at things and of dealing with them.

A question rightly asked is already half answered, said Jacobi; we may add that the method of solution is the other half of the answer, and that the actual result counts for nothing by the side of these two. For an example let us go to the telegraph, where theory and

practice, grown each to years of discretion, are marvellously wedded for the fruitful service of men. Ohm found that the strength of an electric current is directly proportional to the strength of the battery which produces it, and inversely as the length of the wire along which it has to travel. This is called Ohm's law; but the result, regarded as a statement to be believed, is not the valuable part of it. The first half is the question: what relation holds good between these quantities? So put, the question involves already the conception of strength of current, and of strength of battery, as quantities to be measured and compared; it hints clearly that these are the things to be attended to in the study of electric currents. The second half is the method of investigation; how to measure these quantities, what instruments are required for the experiment, and how are they to be used? The student who begins to learn about electricity is not asked to believe in Ohm's law: he is made to understand the question, he is placed before the apparatus, and he is taught to verify it. He learns to do things, not to think he knows things; to use instruments and to ask questions, not to accept a traditional statement. The question which required a genius to ask it rightly is answered by a tyro. If Ohm's law were suddenly lost and forgotten by all men, while the question and the method of solution remained, the result could be rediscovered in an hour. But the result by itself, if known to a people who could not comprehend the value of the question or the means of solving it, would be like a watch in the hands of a savage who could not wind it up, or an iron steamship worked by Spanish engineers.

In regard, then, to the sacred tradition of humanity, we learn that it consists, not in propositions or statements which are to be accepted and believed on the authority of the tradition, but in questions rightly asked, in conceptions which enable us to ask further questions, and in methods of answering questions. The value of all these things depends on their being tested day by day. The very sacredness of the precious deposit imposes upon us the duty and the responsibility of testing it, of purifying and enlarging it to the utmost of our power. He who makes use of its results to stifle his own doubts, or to hamper the inquiry of others, is guilty of a sacrilege which centuries shall never be able to blot out. When the labours and questionings of honest and brave men shall have built up the fabric of known truth to a glory which we in this generation can neither hope for nor imagine, in that pure and holy temple he shall have no part nor lot, but his name and his works shall be cast out into the darkness of oblivion for ever.

III.—The Limits of Inference.

The question in what cases we may believe that which goes beyond our experience, is a very large and delicate one, extending to the whole range of scientific method, and requiring a considerable increase in the application of it before it can be answered with anything approaching to completeness. But one rule, lying on the threshold of the subject, of extreme simplicity and vast practical importance, may here be touched upon and shortly laid down.

A little reflection will show us that every belief, even the simplest and most fundamental, goes beyond experience when regarded as a guide to our actions. A burnt child dreads the fire, because it believes that the fire will burn it to-day just as it did yesterday; but this belief goes beyond experience, and assumes that the unknown fire of to-day is like the known fire of yesterday. Even the belief that the child was burnt yesterday goes beyond *present* experience, which contains only the memory of a burning, and not the burning itself; it assumes, therefore, that this memory is trustworthy, although we know that a memory may often be mistaken. But if it is to be used as a guide to action, as a hint of what the future is to be, it must assume something about that future, namely, that it will be consistent with the supposition that the burning really took place yesterday; which is going beyond experience. Even the fundamental 'I am,' which cannot be doubted, is no guide to action until it takes to itself 'I shall be,' which goes beyond experience. The question is not, therefore, 'May we believe what goes beyond experience?' for this is involved in the very nature of belief; but 'How far and in what manner may we add to our experience in forming our beliefs?'

And an answer, of utter simplicity and universality, is suggested by the example we have taken: a burnt child dreads the fire. We may go beyond experience by assuming that what we do not know is like what we do know; or, in other words, we may add to our experience on the assumption of a uniformity in nature. What this uniformity precisely is, how we grow in the knowledge of it from generation to generation, these are

questions which for the present we lay aside, being content to examine two instances which may serve to make plainer the nature of the rule.

From certain observations made with the spectroscope, we infer the existence of hydrogen in the sun. By looking into the spectroscope when the sun is shining on its slit, we see certain definite bright lines: and experiments made upon bodies on the earth have taught us that when these bright lines are seen hydrogen is the source of them. We assume, then, that the unknown bright lines in the sun are like the known bright lines of the laboratory, and that hydrogen in the sun behaves as hydrogen under similar circumstances would behave on the earth.

But are we not trusting our spectroscope too much? Surely, having found it to be trustworthy for terrestrial substances, where its statements can be verified by man, we are justified in accepting its testimony in other like cases; but not when it gives us information about things in the sun, where its testimony cannot be directly verified by man?

Certainly, we want to know a little more before this inference can be justified; and, fortunately we do know this. The spectroscope testifies to exactly the same thing in the two cases; namely, that light-vibrations of a certain rate are being sent through it. Its construction is such that if it were wrong about this in one case, it would be wrong in the other. When we come to look into the matter, we find that we have really assumed the matter of the sun to be like the matter of the earth, made up of a certain number of distinct substances; and that each of these, when very hot, has a

distinct rate of vibration, by which it may be recognized and singled out from the rest. But this is the kind of assumption which we are justified in using when we add to our experience. It is an assumption of uniformity in nature, and can only be checked by comparison with many similar assumptions which we have to make in other such cases.

But is this a true belief, of the existence of hydrogen in the sun? Can it help in the right guidance of human action?

Certainly not, if it is accepted on unworthy grounds, and without some understanding of the process by which it is got at. But when this process is taken in as the ground of the belief, it becomes a very serious and practical matter. For if there is no hydrogen in the sun, the spectroscope—that is to say, the measurement of rates of vibration—must be an uncertain guide in recognizing different substances; and consequently it ought not to be used in chemical analysis—in assaying, for example—to the great saving of time, trouble, and money. Whereas the acceptance of the spectroscopic method as trustworthy has enriched us not only with new metals, which is a great thing, but with new processes of investigation, which is vastly greater.

For another example, let us consider the way in which we infer the truth of an historical event—say the siege of Syracuse in the Peloponnesian war. Our experience is that manuscripts exist which are said to be and which call themselves manuscripts of the history of Thucydides; that in other manuscripts, stated to be by later historians, he is described as living during the time of the war; and that books, supposed to date

from the revival of learning, tell us how these manuscripts had been preserved and were then acquired. We find also that men do not, as a rule, forge books and histories without a special motive; we assume that in this respect men in the past were like men in the present; and we observe that in this case no special motive was present. That is, we add to our experience on the assumption of a uniformity in the characters of men. Because our knowledge of this uniformity is far less complete and exact than our knowledge of that which obtains in physics, inferences of the historical kind are more precarious and less exact than inferences in many other sciences.

But if there is any special reason to suspect the character of the persons who wrote or transmitted certain books, the case becomes altered. If a group of documents give internal evidence that they were produced among people who forged books in the names of others, and who, in describing events, suppressed those things which did not suit them, while they amplified such as did suit them; who not only committed these crimes, but gloried in them as proofs of humility and zeal; then we must say that upon such documents no true historical inference can be founded, but only unsatisfactory conjecture.

We may, then, add to our experience on the assumption of a uniformity in nature; we may fill in our picture of what is and has been, as experience gives it us, in such a way as to make the whole consistent with this uniformity. And practically demonstrative inference—that which gives us a right to believe in the result of it—is a clear showing that in no other way

than by the truth of this result can the uniformity of nature be saved.

No evidence, therefore, can justify us in believing the truth of a statement which is contrary to, or outside of, the uniformity of nature. If our experience is such that it cannot be filled up consistently with uniformity, all we have a right to conclude is that there is something wrong somewhere; but the possibility of inference is taken away; we must rest in our experience, and not go beyond it at all. If an event really happened which was not a part of the uniformity of nature, it would have two properties: no evidence could give the right to believe it to any except those whose actual experience it was; and no inference worthy of belief could be founded upon it at all.

Are we then bound to believe that nature is absolutely and universally uniform? Certainly not; we have no right to believe anything of this kind. The rule only tells us that in forming beliefs which go beyond our experience, we may make the assumption that nature is practically uniform so far as we are concerned. Within the range of human action and verification, we may form, by help of this assumption, actual beliefs; beyond it, only those hypotheses which serve for the more accurate asking of questions.

To sum up:—

We may believe what goes beyond our experience, only when it is inferred from that experience by the assumption that what we do not know is like what we know.

We may believe the statement of another person, when there is reasonable ground for supposing that he

knows the matter of which he speaks, and that he is speaking the truth so far as he knows it.

It is wrong in all cases to believe on insufficient evidence; and where it is presumption to doubt and to investigate, there it is worse than presumption to believe.

THE ETHICS OF RELIGION.[1]

THE word *religion* is used in many different meanings, and there have been not a few controversies in which the main difference between the contending parties was only this, that they understood by *religion* two different things. I will therefore begin by setting forth as clearly as I can one or two of the meanings which the word appears to have in popular speech.

First, then, it may mean a body of doctrines, as in the common phrase, 'The truth of the Christian religion;' or in this sentence, 'The religion of the Buddha teaches that the soul is not a distinct substance.' Opinions differ upon the question what doctrines may properly be called religious; some people holding that there can be no religion without belief in a God and in a future life, so that in their judgment the body of doctrines must necessarily include these two; while others would insist upon other special dogmas being included, before they could consent to call the system by this name. But the number of such people is daily diminishing, by reason of the spread and the increase of our knowledge about distant countries and races. To me, indeed, it would seem rash to assert of any doctrine or its contrary that it might not form part of a religion. But, fortunately, it is not necessary to any part of the

[1] *Fortnightly Review*, July, 1877.

discussion on which I propose to enter that this question should be settled.

Secondly, religion may mean a *ceremonial* or *cult*, involving an organized priesthood and a machinery of sacred things and places. In this sense we speak of the clergy as ministers of religion, or of a state as tolerating the practice of certain religions. There is a somewhat wider meaning which it will be convenient to consider together with this one, and as a mere extension of it, namely, that in which religion stands for the influence of a certain priesthood. A religion is sometimes said to have been successful when it has got its priests into power; thus some writers speak of the wonderfully rapid success of Christianity. A nation is said to have embraced a religion when the authorities of that nation have granted privileges to the clergy, have made them as far as possible the leaders of society, and have given them a considerable share in the management of public affairs. So the northern nations of Europe are said to have embraced the Catholic religion at an early date. The reason why it seems to me convenient to take these two meanings together is, that they are both related to the priesthood. Although the priesthood itself is not called religion, so far as I know, yet the word is used for the general influence and professional acts of the priesthood.

Thirdly, religion may mean a body of precepts or code of rules, intended to guide human conduct, as in this sentence of the authorized version of the New Testament: 'Pure religion and undefiled before God and the Father is this, to visit the fatherless and widows in their affliction, and to keep himself unspotted from the

world' (James, i. 27). It is sometimes difficult to draw the line between this meaning and the last, for it is a mark of the great majority of religions that they confound ceremonial observances with duties having real moral obligation. Thus in the Jewish decalogue the command to do no work on Saturdays is found side by side with the prohibition of murder and theft. It might seem to be the more correct as well as the more philosophical course to follow in this matter the distinction made by Butler between *moral* and *positive* commands, and to class all those precepts which are not of universal moral obligation under the head of ceremonial. And, in fact, when we come to examine the matter from the point of view of morality, the distinction is of the utmost importance. But from the point of view of religion there are difficulties in making it. In the first place, the distinction is not made, or is not understood, by religious folk in general. Innumerable tracts and pretty stories impress upon us that Sabbath-breaking is rather worse than stealing, and leads naturally on to materialism and murder. Less than a hundred years ago sacrilege was punishable by burning in France, and murder by simple decapitation. In the next place, if we pick out a religion at haphazard, we shall find that it is not at all easy to divide its precepts into those which are really of moral obligation and those which are indifferent and of a ceremonial character. We may find precepts unconnected with any ceremonial, and yet positively immoral; and ceremonials may be immoral in themselves, or constructively immoral on account of their known symbolism. On the whole, it seems to me most convenient to draw the plain and obvious

distinction between those actions which a religion prescribes to *all* its followers, whether the actions are ceremonial or not, and those which are prescribed only as professional actions of a sacerdotal class. The latter will come under what I have called the second meaning of religion, the professional acts and the influence of a priesthood. In the third meaning will be included all that practically guides the life of a layman, in so far as this guidance is supplied to him by his religion.

Fourthly, and lastly, there is a meaning of the word *religion* which has been coming more and more prominently forward of late years, till it has even threatened to supersede all the others. Religion has been defined as *morality touched with emotion.* I will not here adopt this definition, because I wish to deal with the concrete in the first place, and only to pass on to the abstract in so far as that previous study appears to lead to it. I wish to consider the facts of religion as we find them, and not ideal possibilities. 'Yes, but,' everyone will say, 'if you mean my own religion, it is already, as a matter of fact, morality touched with emotion. It is the highest morality touched with the purest emotion, an emotion directed towards the most worthy of objects.' Unfortunately we do not mean your religion alone, but all manner of heresies and heathenisms along with it: the religions of the Thug, of the Jesuit, of the South Sea cannibal, of Confucius, of the poor Indian with his untutored mind, of the Peculiar People, of the Mormons, and of the old cat-worshipping Egyptian. It must be clear that we shall restrict ourselves to a very narrow circle of what are commonly called religious facts, unless we include in our considerations not only morality

touched with emotion, but also immorality touched with emotion. In fact, what is really touched with emotion in any case is that body of precepts for the guidance of a layman's life which we have taken to be the third meaning of religion. In that collection of precepts there may be some agreeable to morality, and some repugnant to it, and some indifferent, but being all enjoined by the religion they will all be touched by the same religious emotion. Shall we then say that religion means a feeling, an emotion, an habitual attitude of mind towards some object or objects, or towards life in general, which has a bearing upon the way in which men regard the rules of conduct? I think the last phrase should be left out. An habitual attitude of mind, of a religious character, does always have some bearing upon the way in which men regard the rules of conduct; but it seems sometimes as if this were an accident, and not the essence of the religious feeling. Some devout people prefer to have their devotion pure and simple, without admixture of any such application—they do not want to listen to 'cauld morality.' And it seems as if the religious feeling of the Greeks, and partly also of our own ancestors, was so far divorced from morality that it affected it only, as it were, by a side-wind, through the influence of the character and example of the Gods. So that it seems only likely to create confusion if we mix up morality with this fourth meaning of religion. Sometimes religion means a code of precepts, and sometimes it means a devotional habit of mind; the two things are sometimes connected, but also they are sometimes quite distinct. But that the connexion of these two things is more and more insisted on, that it is the key-

note of the apparent revival of religion which has taken place in this century, is a very significant fact, about which there is more to be said.

As to the nature of this devotional habit of mind, there are no doubt many who would like a closer definition. But I am not at all prepared to say what attitude of mind may properly be called religious, and what may not. Some will hold that religion must have a person for its object; but the Buddha was filled with religious feeling, and yet he had no personal object. Spinoza, the God-intoxicated man, had no personal object for his devotion. It might be possible to frame a definition which would fairly include all cases, but it would require the expenditure of vast ingenuity and research, and would not, I am inclined to think, be of much use when it was obtained.

Nor is the difficulty to be got over by taking any definite and well-organized sect, whose principles are settled in black and white; for example, the Roman Catholic Church, whose seamless unity has just been exhibited and protected by an Œcumenical Council. Shall we listen to Mr. Mivart, who 'execrates without reserve Marian persecutions, the Massacre of St. Bartholomew, and all similar acts'? or to the editor of the *Dublin Review*, who thinks that a teacher of false doctrines 'should be visited by the law with just that amount of severity which the public sentiment will bear'? For assuredly common-sense morality will pass very different judgments on these two distinct religions, although it appears that experts have found room for both of them within the limits of the Vatican definitions.

Moreover, there is very great good to be got by widening our view of what may be contained in religion. If we go to a man and propose to test his own religion by the canons of common-sense morality, he will be, most likely, offended, for he will say that his religion is far too sublime and exalted to be affected by considerations of that sort. But he will have no such objection in the case of other people's religion. And when he has found that in the name of religion other people, in other circumstances, have believed in doctrines that were false, have supported priesthoods that were social evils, have taken wrong for right, and have even poisoned the very sources of morality, he may be tempted to ask himself, 'Is there no trace of any of these evils in my own religion, or at least in my own conception and practice of it?' And that is just what we want him to do. Bring your doctrines, your priesthoods, your precepts, yea, even the inner devotion of your soul, before the tribunal of conscience; she is no man's and no God's vicar, but the supreme judge of men and Gods.

Let us enquire, then, what morality has to say in regard to religious doctrines. It deals with the *manner* of religious belief directly, and with the *matter* indirectly. Religious beliefs must be founded on evidence; if they are not so founded, it is wrong to hold them. The rule of right conduct in this matter is exactly the opposite of that implied in the two famous texts: 'He that believeth not shall be damned,' and 'Blessed are they that have not seen and yet have believed.' For a man who clearly felt and recognized the duty of intellectual honesty, of carefully testing

every belief before he received it, and especially before he recommended it to others, it would be impossible to ascribe the profoundly immoral teaching of these texts to a true prophet or worthy leader of humanity. It will comfort those who wish to preserve their reverence for the character of a great teacher to remember that one of these sayings is in the well-known forged passage at the end of the second gospel, and that the other occurs only in the late and legendary fourth gospel; both being described as spoken under utterly impossible circumstances. These precepts belong to the Church and not to the Gospel. But whoever wrote either of them down as a deliverance of one whom he supposed to be a divine teacher, has thereby written down himself as a man void of intellectual honesty, as a man whose word cannot be trusted, as a man who would accept and spread about any kind of baseless fiction for fear of believing too little.

So far as to the manner of religious belief. Let us now inquire what bearing morality has upon its matter. We may see at once that this can only be indirect; for the rightness or wrongness of belief in a doctrine depends only upon the nature of the evidence for it, and not upon what the doctrine is. But there is a very important way in which religious doctrine may lead to morality or immorality, and in which, therefore, morality has a bearing upon doctrine. It is when that doctrine declares the character and actions of the Gods who are regarded as objects of reverence and worship. If a God is represented as doing that which is clearly wrong, and is still held up to the reverence of men, they will be tempted to think that in doing this wrong

thing they are not so very wrong after all, but are only following an example which all men respect. So says Plato:—[1]

'We must not tell a youthful listener that he will be doing nothing extraordinary if he commit the foulest crimes, nor yet if he chastise the crimes of a father in the most unscrupulous manner, but will simply be doing what the first and greatest of the Gods have done before him. . . .

'Nor yet is it proper to say in any case—what is indeed untrue—that Gods wage war against Gods, and intrigue and fight among themselves; that is, if the future guardians of our state are to deem it a most disgraceful thing to quarrel lightly with one another: far less ought we to select as subjects for fiction and embroidery the battles of the giants, and numerous other feuds of all sorts, in which Gods and heroes fight against their own kith and kin. But if there is any possibility of persuading them that to quarrel with one's fellow is a sin of which no member of a state was ever guilty, such ought rather to be the language held to our children from the first, by old men and old women, and all elderly persons; and such is the strain in which our poets must be compelled to write. But stories like the chaining of Hera by her son, and the flinging of Hephaistos out of heaven for trying to take his mother's part when his father was beating her, and all those battles of the Gods which are to be found in Homer, must be refused admittance into our state, whether they be allegorical or not. For a child cannot discriminate between what is allegory and what

[1] Rep. ii. 378. Tr. Davies and Vaughan.

is not; and whatever at that age is adopted as a matter of belief has a tendency to become fixed and indelible, and therefore, perhaps, we ought to esteem it of the greatest importance that the fictions which children first hear should be adapted in the most perfect manner to the promotion of virtue.'

And Seneca says the same thing, with still more reason in his day and country: 'What else is this appeal to the precedent of the Gods for, but to inflame our lusts, and to furnish licence and excuse for the corrupt act under the divine protection?' And again, of the character of Jupiter as described in the popular legends: 'This has led to no other result than to deprive sin of its shame in man's eyes, by showing him the God no better than himself.' In Imperial Rome, the sink of all nations, it was not uncommon to find 'the intending sinner addressing to the deified vice which he contemplated a prayer for the success of his design; the adulteress imploring of Venus the favours of her paramour; . . . the thief praying to Hermes Dolios for aid in his enterprise, or offering up to him the first fruits of his plunder; . . . youths entreating Hercules to expedite the death of a rich uncle.'[1]

When we reflect that criminal deities were worshipped all over the empire, we cannot but wonder that any good people were left; that man could still be holy, although every God was vile. Yet this was undoubtedly the case; the social forces worked steadily on wherever there was peace and a settled government and municipal freedom; and the wicked stories of theologians were somehow explained away and disregarded. If men

[1] *North British Review*, 1867, p. 284.

were no better than their religions, the world would be a hell indeed.

It is very important, however, to consider what really ought to be done in the case of stories like these. When the poet sings that Zeus kicked Hephaistos out of heaven for trying to help his mother, Plato says that this fiction must be suppressed by law. We cannot follow him there, for since his time we have had too much of trying to suppress false doctrines by law. Plato thinks it quite obviously clear that God cannot produce evil, and he would stop everybody's mouth who ventured to say that he can. But in regard to the doctrine itself, we can only ask, 'Is it true?' And that is a question to be settled by evidence. Did Zeus commit this crime, or did he not? We must ask the apologists, the reconcilers of religion and science, what evidence they can produce to prove that Zeus kicked Hephaistos out of heaven. That a doctrine may lead to immoral consequences is no reason for disbelieving it. But whether the doctrine were true or false, one thing does clearly follow from its moral character: namely this, that if Zeus behaved as he is said to have behaved, he ought not to be worshipped. To those who complain of his violence and injustice, it is no answer to say that the divine attributes are far above human comprehension; that the ways of Zeus are not our ways, neither are his thoughts our thoughts. If he is to be worshipped, he must do something vaster and nobler and greater than good men do, but it must be like what they do in its goodness. His actions must not be merely a magnified copy of what bad men do. So soon as they are thus represented, morality has something to

say. Not indeed about the fact; for it is not conscience, but reason, that has to judge matters of fact; but about the worship of a character so represented. If there really is good evidence that Zeus kicked Hephaistos out of heaven, and seduced Alkmene by a mean trick, say so by all means; but say also that it is wrong to salute his priests or to make offerings in his temple.

When men do their duty in this respect, morality has a very curious indirect effect on the religious doctrine itself. As soon as the offerings become less frequent, the evidence for the doctrine begins to fade away; the process of theological interpretation gradually brings out the true inner meaning of it, that Zeus did not kick Hephaistos out of heaven, and did not seduce Alkmene.

Is this a merely theoretical discussion about far-away things? Let us come back for a moment to our own time and country, and think whether there can be any lesson for us in this refusal of common-sense morality to worship a deity whose actions are a magnified copy of what bad men do. There are three doctrines which find very wide acceptance among our countrymen at the present day: the doctrines of original sin, of a vicarious sacrifice, and of eternal punishments. We are not concerned with any refined evaporations of these doctrines which are exhaled by courtly theologians, but with the naked statements which are put into the minds of children and of ignorant people, which are taught broadcast and without shame in denominational schools. Father Faber, good soul, persuaded himself that after all only a very few people would be really damned, and Father Oxenham gives

one the impression that it will not hurt even them very much. But one learns the practical teaching of the Church from such books as 'A Glimpse of Hell,' where a child is described as thrown between the bars upon the burning coals, there to writhe for ever. The masses do not get the elegant emasculations of Father Faber and Father Oxenham; they get 'a Glimpse of Hell.'

Now to condemn all mankind for the sin of Adam and Eve; to let the innocent suffer for the guilty; to keep anyone alive in torture for ever and ever; these actions are simply magnified copies of what bad men do. No juggling with 'divine justice and mercy' can make them anything else. This must be said to all kinds and conditions of men: that if God holds all mankind guilty for the sin of Adam, if he has visited upon the innocent the punishment of the guilty, if he is to torture any single soul for ever, then it is wrong to worship him.

But there is something to be said also to those who think that religious beliefs are not indeed true, but are useful for the masses; who deprecate any open and public argument against them, and think that all sceptical books should be published at a high price; who go to church, not because they approve of it themselves, but to set an example to the servants. Let us ask them to ponder the words of Plato, who, like them, thought that all these tales of the Gods were fables, but still fables which might be useful to amuse children with: '*We ought to esteem it of the greatest importance that the fictions which children first hear should be adapted in the most perfect manner to the promotion of virtue.*' If we

grant to you that it is good for poor people and children to believe some of these fictions, is it not better, at least, that they should believe those which are adapted to the promotion of virtue? Now the stories which you send your servants and children to hear are adapted to the promotion of vice. So far as the remedy is in your own hands, you are bound to apply it; stop your voluntary subscriptions and the moral support of your presence from any place where the criminal doctrines are taught. You will find more men and better men to preach that which is agreeable to their conscience, than to thunder out doctrines under which their minds are always uneasy, and which only a continual self-deception can keep them from feeling to be wicked.

Let us now go on to enquire what morality has to say in the matter of religious *ministrations*, the official acts and the general influence of a priesthood. This question seems to me a more difficult one than the former; at any rate it is not so easy to find general principles which are at once simple in their nature and clear to the conscience of any man who honestly considers them. One such principle, indeed, there is, which can hardly be stated in a Protestant country without meeting with a cordial response; being indeed that characteristic of our race which made the Reformation a necessity, and became the soul of the Protestant movement. I mean the principle which forbids the priest to come between a man and his conscience. If it be true, as our daily experience teaches us, that the moral sense gains in clearness and power by exercise, by the constant endeavour to find out and to see for ourselves what is right and what is wrong, it must be nothing

short of a moral suicide to delegate our conscience to another man. It is true that when we are in difficulties and do not altogether see our way, we quite rightly seek counsel and advice of some friend who has more experience, more wisdom begot by it, more devotion to the right than ourselves, and who, not being involved in the difficulties which encompass us, may more easily see the way out of them. But such counsel does not and ought not to take the place of our private judgment; on the contrary, among wise men it is asked and given for the purpose of helping and supporting private judgment. I should go to my friend, not that he may tell me what to do, but that he may help me to see what is right.

Now, as we all know, there is a priesthood whose influence is not to be made light of, even in our own land, which claims to do two things: to declare with infallible authority what is right and what is wrong, and to take away the guilt of the sinner after confession has been made to it. The second of these claims we shall come back upon in connexion with another part of the subject. But that claim is one which, as it seems to me, ought to condemn the priesthood making it in the eyes of every conscientious man. We must take care to keep this question to itself, and not to let it be confused with quite different ones. The priesthood in question, as we all know, has taught that as right which is not right, and has condemned as wrong some of the holiest duties of mankind. But this is not what we are here concerned with. Let us put an ideal case of a priesthood which, as a matter of fact, taught a morality agreeing with the healthy conscience of all men at a given time; but which,

nevertheless, taught this as an infallible revelation. The tendency of such teaching, if really accepted, would be to destroy morality altogether, for it is of the very essence of the moral sense that it is a common perception by men of what is good for man. It arises, not in one man's mind by a flash of genius or a transport of ecstasy, but in all men's minds, as the fruit of their necessary intercourse and united labour for a common object. When an infallible authority is set up, the voice of this natural human conscience must be hushed and schooled, and made to speak the words of a formula. Obedience becomes the whole duty of man; and the notion of right is attached to a lifeless code of rules, instead of being the informing character of a nation. The natural consequence is that it fades gradually out and ends by disappearing altogether. I am not describing a purely conjectural state of things, but an effect which has actually been produced at various times and in considerable populations by the influence of the Catholic Church. It is true that we cannot find an actually crucial instance of a pure morality taught as an infallible revelation, and so in time ceasing to be morality for that reason alone. There are two circumstances which prevent this. One is that the Catholic priesthood has always practically taught an imperfect morality, and that it is difficult to distinguish between the effects of precepts which are wrong in themselves, and precepts which are only wrong because of the manner in which they are enforced. The other circumstance is that the priesthood has very rarely found a population willing to place itself completely and absolutely under priestly control. Men must live together and work for common

objects even in priest-ridden countries; and those conditions which in the course of ages have been able to create the moral sense cannot fail in some degree to recall it to men's minds and gradually to reinforce it. Thus it comes about that a great and increasing portion of life breaks free from priestly influences, and is governed upon right and rational grounds. The goodness of men shows itself in time more powerful than the wickedness of some of their religions.

The practical inference is, then, that we ought to do all in our power to restrain and diminish the influence of any priesthood which claims to rule consciences. But when we attempt to go beyond this plain Protestant principle, we find that the question is one of history and politics. The question which we want to ask ourselves —'Is it right to support this or that priesthood?'—can only be answered by this other question, 'What has it done or got done?'

In asking this question, we must bear in mind that the word *priesthood*, as we have used it hitherto, has a very wide meaning—namely, it means any body of men who perform special ceremonies in the name of religion; a *ceremony* being an act which is prescribed by religion to that body of men, but not on account of its intrinsic rightness or wrongness. It includes, therefore, not only the priests of Catholicism, or of the Obi rites, who lay claim to a magical character and powers, but the more familiar clergymen or ministers of Protestant denominations, and the members of monastic orders. But there is a considerable difference, pointed out by Hume, between a priest, who lays claim to a magical character and powers, and a clergyman, in the English sense, as it

was understood in Hume's day, whose office was to remind people of their duties every Sunday, and to represent a certain standard of culture in remote country districts. It will, perhaps, conduce to clearness if we use the word *priest* exclusively in the first sense.

There is another confusion which we must endeavour to avoid, if we would really get at the truth of this matter. When one ventures to doubt whether the Catholic clergy has really been an unmixed blessing to Europe, one is generally met by the reply, 'You cannot find any fault with the Sermon on the Mount.' Now it would be too much to say that this has nothing to do with the question we were proposing to ask, for there is a sense in which the Sermon on the Mount and the Catholic clergy have something to do with each other. The Sermon on the Mount is admitted on all hands to be the best and most precious thing that Christianity has offered to the world; and it cannot be doubted that the Catholic clergy of East and West were the only spokesmen of Christianity until the Reformation, and are the spokesmen of the vast majority of Christians at this moment. But it must surely be unnecessary to say in a Protestant country that the Catholic Church and the Gospel are two very different things. The moral teaching of Christ, as partly preserved in the three first gospels, or—which is the same thing—the moral teaching of the great Rabbi Hillel, as partly preserved in the Pirkè Aboth, is the expression of the conscience of a people who had fought long and heroically for their national existence. In that terrible conflict they had learned the supreme and overwhelming importance of conduct, the necessity for those who would survive of

fighting manfully for their lives and making a stand against the hostile powers around; the weakness and uselessness of solitary and selfish efforts, the necessity for a man who would be a man to lose his poor single personality in the being of a greater and nobler combatant—the nation. And they said all this, after their fashion of short and potent sayings, perhaps better than any other men have said it before or since. 'If I am not for myself,' said the great Hillel, 'who is for me? And if I am only for myself, where is the use of me? *And if not now, when?*' It would be hard to find a more striking contrast than exists between the sturdy unselfish independence of this saying, and the abject and selfish servility of the priest-ridden claimant of the skies. It was this heroic people that produced the morality of the Sermon on the Mount. But it was not they who produced the priests and the dogmas of Catholicism. Shaven crowns, linen vestments, and the claim to priestly rule over consciences, these were dwellers on the banks of the Nile. The gospel indeed came out of Judæa, but the Church and her dogmas came out of Egypt. Not, as it is written, 'Out of Egypt have I called my son,' but, 'Out of Egypt have I called my daughter.' St. Gregory of Nazianzum remarked with wonder that Egypt, having so lately worshipped bulls, goats, and crocodiles, was now teaching the world the worship of the Trinity in its truest form.[1] Poor, simple St. Gregory! it was not that Egypt had risen higher, but that the world had sunk lower. The empire, which in the time of Augustus had dreaded, and with reason, the corrupting influence of Egyptian

[1] See Sharpe, 'Egyptian Mythology and Egyptian Christianity,' p. 114.

superstitions, was now eaten up by them, and rapidly rotting away.

Then, when we ask what has been the influence of the Catholic clergy upon European nations, we are not inquiring about the results of accepting the morality of the Sermon on the Mount; we are inquiring into the effect of attaching an Egyptian priesthood, which teaches Egyptian dogmas, to the life and sayings of a Jewish prophet.

In this inquiry, which requires the knowledge of facts beyond our own immediate experience, we must make use of the great principle of authority, which enables us to profit by the experience of other men. The great civilized countries on the continent of Europe at the present day—France, Germany, Austria, and Italy—have had an extensive experience of the Catholic clergy for a great number of centuries, and they are forced by strong practical reasons to form a judgment upon the character and tendencies of an institution which is sufficiently powerful to command the attention of all who are interested in public affairs. We might add the experience of our forefathers three centuries ago, and of Ireland at this moment; but home politics are apt to be looked upon with other eyes than those of reason. Let us hear, then, the judgment of the civilized people of Europe on this question.

It is a matter of notoriety that an aider and abettor of clerical pretensions is regarded in France as an enemy of France and of Frenchmen; in Germany as an enemy of Germany and of Germans; in Austria as an enemy of Austria and Hungary, of both Austrians and Magyars; and in Italy as an enemy of Italy and the Italians. He

is so regarded, not by a few wild and revolutionary enthusiasts who have cast away all the beliefs of their childhood, and all bonds connecting them with the past, but by a great and increasing majority of sober and conscientious men of all creeds and persuasions, who are filled with a love for their country, and whose hopes and aims for the future are animated and guided by the examples of those who have gone before them, and by a sense of the continuity of national life. The profound conviction and determination of the people in all these countries, that the clergy must be restricted to a purely ceremonial province, and must not be allowed to interfere, as clergy, in public affairs—this conviction and determination, I say, are not the effect of a rejection of the Catholic dogmas. Such rejection has not in fact been made in Catholic countries by the great majority. It involves many difficult speculative questions, the profound disturbance of old habits of thought, and the toilsome consideration of abstract ideas. But such is the happy inconsistency of human nature, that men who would be shocked and pained by a doubt about the central doctrines of their religions are far more really and practically shocked and pained by the moral consequences of clerical ascendency. About the dogmas they do not know; they were taught them in childhood, and have not inquired into them since, and therefore they are not competent witnesses to the truth of them. But about the priesthood they do know, by daily and hourly experience; and to its character they are competent witnesses. No man can express his convictions more forcibly than by acting upon them in a great and solemn matter of national importance. In all these countries

the conviction of the serious and sober majority of the people is embodied, and is being daily embodied, in special legislation, openly and avowedly intended to guard against clerical aggression. The more closely the legislature of these countries reflects the popular will, the more clear and pronounced does this tendency become. It may be thwarted or evaded for the moment by constitutional devices and parliamentary tricks, but sooner or later the nation will be thoroughly represented in all of them: and as to what is then to be expected, let the panic of the clerical parties make answer.

This is a state of opinion and of feeling which we in our own country find it hard to understand, although it is one of the most persistent characters of our nation in past times. We have spoken so plainly and struck so hard in the past, that we seem to have won the right to let this matter alone. We think our enemies are dead, and we forget that our neighbour's enemies are plainly alive: and then we wonder that he does not sit down and be quiet as we are. We are not much accustomed to be afraid, and we never know when we are beaten. But those who are nearer to the danger feel a very real and, it seems to me, well-grounded fear. The whole structure of modern society, the fruit of long and painful efforts, the hopes of further improvement, the triumphs of justice, of freedom, and of light, the bonds of patriotism which make each nation one, the bonds of humanity which bring different nations together—all these they see to be menaced with a great and real and even pressing danger. For myself I confess that I cannot help feeling as they feel. It seems to me quite possible that the moral and intellectual culture of Europe, the light

and the right, what makes life worth having and men worthy to have it, may be clean swept away by a revival of superstition. We are, perhaps, ourselves not free from such a domestic danger; but no one can doubt that the danger would speedily arise if all Europe at our side should become again barbaric, not with the weakness and docility of a barbarism which has never known better, but with the strength of a past civilization perverted to the service of evil.

Those who know best, then, about the Catholic priesthood at present, regard it as a standing menace to the state and to the moral fabric of society.

Some would have us believe that this condition of things is quite new, and has in fact been created by the Vatican Council. In the Middle Ages, they say, the Church did incalculable service; or even if you do not allow that, yet the ancient Egyptian priesthood invented many useful arts; or if you have read anything which is not to their credit, there were the Babylonians and Assyrians who had priests, thousands of years ago; and in fact, the more you go back into prehistoric ages, and the further you go away into distant countries, the less you can find to say against the priesthoods of those times and places. This statement, for which there is certainly much foundation, may be put into another form: the more you come forward into modern times and neighbouring countries, where the facts can actually be got at, the more complete is the evidence against the priesthoods of these times and places. But the whole argument is founded upon what is at least a doubtful view of human nature and of society. Just as an early school of geologists were accustomed to explain the pre-

sent state of the earth's surface by supposing that in primitive ages the processes of geologic change were far more violent and rapid than they are now—so catastrophic, indeed, as to constitute a thoroughly different state of things—so there is a school of historians who think that the intimate structure of human nature, its capabilities of learning and of adapting itself to society, have so far altered within the historic period as to make the present processes of social change totally different in character from those even of the moderately distant past. They think that institutions and conditions which are plainly harmful to us now have at other times and places done good and serviceable work. War, pestilence, priestcraft, and slavery have been represented as positive boons to an early state of society. They are not blessings to us, it is true; but then times have altered very much.

On the other hand, a later school of geologists have seen reason to think that the processes of change have never, since the earth finally solidified, been very different from what they are now. More rapid, indeed, they must have been in early times, for many reasons; but not so very much more rapid as to constitute an entirely different state of things. And it does seem to me in like manner that a wider and more rational view of history will recognize more and more of the permanent, and less and less of the changeable, element in human nature. No doubt our ancestors of a thousand generations back were very different beings from ourselves; perhaps fifty thousand generations back they were not men at all. But the historic period is hardly to be stretched beyond two hundred generations; and it seems unreasonable to

expect that in such a tiny page of our biography we can trace with clearness the growth and progress of a long life. Compare Egypt in the time of King Menes, say six thousand years ago, with Spain in this present century, before Englishmen made any railways there: I suppose the main difference is that the Egyptians washed themselves. It seems more analogous to what we find in other fields of inquiry to suppose that there are certain great broad principles of human life which have been true all along; that certain conditions have always been favourable to the health of society, and certain other conditions always hurtful.

Now, although I have many times asked for it from those who said that somewhere and at some time mankind had derived benefits from a priesthood laying claim to a magical character and powers, I have never been able to get any evidence for their statement. Nobody will give me a date, and a latitude and longitude, that I may examine into the matter. 'In the Middle Ages the priests and monks were the sole depositaries of learning.' Quite so; a man burns your house to the ground, builds a wretched hovel on the ruins, and then takes credit for whatever shelter there is about the place. In the Middle Ages nearly all learned men were obliged to become priests and monks. 'Then again, the bishops have sometimes acted as tribunes of the people, to protect them against the tyranny of kings.' No doubt, when Pope and Cæsar fall out, honest men may come by their own. If two men rob you in a dark lane, and then quarrel over the plunder, so that you get a chance to escape with your life, you will of course be very grateful to each of them for having prevented

the other from killing you; but you would be much more grateful to a policeman who locked them both up. Two powers have sought to enslave the people, and have quarrelled with each other; certainly we are very much obliged to them for quarrelling, but a condition of still greater happiness and security would be the non-existence of both.

I can find no evidence that seriously militates against the rule that the priest is at all times and in all places the enemy of all men—*Sacerdos semper, ubique, et omnibus inimicus.* I do not deny that the priest is very often a most earnest and conscientious man, doing the very best that he knows of as well as he can do it. Lord Amberley is quite right in saying that the blame rests more with the laity than with the priesthood; that it has insisted on magic and mysteries, and has forced the priesthood to produce them. But then, how dreadful is the system that puts good men to such uses!

And although it is true that in its origin a priesthood is the effect of an evil already existing, a symptom of social disease rather than a cause of it, yet, once being created and made powerful, it tends in many ways to prolong and increase the disease which gave it birth. One of these ways is so marked and of such practical importance that we are bound to consider it here: I mean the education of children. If there is one lesson which history forces upon us in every page, it is this: *Keep your children away from the priest, or he will make them the enemies of mankind.* It is not the Catholic clergy and those like them who are alone to be dreaded in this matter; even the representatives of apparently harmless religions may do incalculable mischief if they

get education into their hands. To the early Mohammedans the mosque was the one public building in every place where public business could be transacted; and so it was naturally the place of primary education, which they held to be a matter of supreme importance. By-and-by, as the clergy grew up, the mosque was gradually usurped by them, and primary education fell into their hands. Then ensued a 'revival of religion;' religion became a fanaticism: books were burnt and universities were closed; the empire rotted away in East and West, until it was conquered by Turkish savages in Asia and by Christian savages in Spain.

The labours of students of the early history of institutions—notably Sir Henry Maine and M. de Laveleye—have disclosed to us an element of society which appears to have existed in all times and places, and which is the basis of our own social structure. The village community, or commune, or township, found in tribes of the most varied race and time, has so modified itself as to get adapted in one place or another to all the different conditions of human existence. This union of men to work for a common object has transformed them from wild animals into tame ones. Century by century the educating process of the social life has been working at human nature; it has built itself into our inmost soul. Such as we are—moral and rational beings—thinking and talking in general conceptions about the facts that make up our life, feeling a necessity to act, not for ourselves, but for Ourself, for the larger life of Man in which we are elements; such moral and rational beings, I say, Man has made us. By Man I mean men organized into a society, which fights for its life, not only as a mere

collection of men who must separately be kept alive, but as a society. It must fight, not only against external enemies, but against treason and disruption within it. Hence comes the unity of interest of all its members; each of them has to feel that he is not himself only but a part of all the rest. Conscience—the sense of right and wrong—springs out of the habit of judging things from the point of view of all and not of one. It is Ourself, not ourselves, that makes for righteousness.

The codes of morality, then, which are adopted into various religions, and afterwards taught as parts of religious systems, are derived from secular sources. The most ancient version of the Ten Commandments, whatever the investigations of scholars may make it out to be, originates, not in the thunders of Sinai, but in the peaceful life of men on the plains of Chaldæa. Conscience is the voice of Man ingrained into our hearts, commanding us to work for Man.

Religions differ in the treatment which they give to this most sacred heirloom of our past history. Sometimes they invert its precepts—telling men to be submissive under oppression because the powers that be are ordained of God; telling them to believe where they have not seen, and to play with falsehood in order that a particular doctrine may prevail, instead of seeking for truth whatever it may be; telling them to betray their country for the sake of their church. But there is one great distinction to which I wish, in conclusion, to call special attention—a distinction between two kinds of religious emotion which bear upon the conduct of men.

We said that conscience is the voice of Man within us, commanding us to work for Man. We do not know

this immediately by our own experience; we only know that something within us commands us to work for Man. This fact men have tried to explain; and they have thought, for the most part, that this voice was the voice of a God. But the explanation takes two different forms: the God may speak in us for Man's sake, or for his own sake. If he speaks for his own sake—and this is what generally happens when he has priests who lay claim to a magical character and powers—our allegiance is apt to be taken away from Man, and transferred to the God. When we love our brother for the sake of our brother, we help all men to grow in the right; but when we love our brother for the sake of somebody else, who is very likely to damn our brother, it very soon comes to burning him alive for his soul's health. When men respect human life for the sake of Man, tranquillity, order, and progress go hand in hand; but those who only respected human life because God had forbidden murder have set their mark upon Europe in fifteen centuries of blood and fire.

These are only two examples of a general rule. Wherever the allegiance of men has been diverted from Man to some divinity who speaks to men for his own sake and seeks his own glory, one thing has happened. The right precepts might be enforced, but they were enforced upon wrong grounds, and they were not obeyed. But right precepts are not always enforced; the fact that the fountains of morality have been poisoned makes it easy to substitute wrong precepts for right ones.

To this same treason against humanity belongs the claim of the priesthood to take away the guilt of a sinner

after confession has been made to it. The Catholic priest professes to act as an ambassador for his God, and to absolve the guilty man by conveying to him the forgiveness of heaven. If his credentials were ever so sure, if he were indeed the ambassador of a superhuman power, the claim would be treasonable. Can the favour of the Czar make guiltless the murderer of old men and women and children in Circassian valleys? Can the pardon of the Sultan make clean the bloody hands of a Pasha? As little can any God forgive sins committed against man. When men think he can, they compound for old sins which the God did not like by committing new ones which he does like. Many a remorseful despot has atoned for the levities of his youth by the persecution of heretics in his old age. That frightful crime, the adulteration of food, could not possibly be so common amongst us if men were not taught to regard it as merely objectionable because it is remotely connected with stealing, of which God has expressed his disapproval in the Decalogue; and therefore as quite naturally set right by a punctual attendance at church on Sundays. When a Ritualist breaks his fast before celebrating the Holy Communion, his deity can forgive him if he likes, for the matter concerns nobody else; but no deity can forgive him for preventing his parishioners from setting up a public library and reading-room for fear they should read Mr. Darwin's works in it. That sin is committed against the people, and a God cannot take it away.

I call those religions which undermine the supreme allegiance of the conscience to Man *ultramontane* religions, because they seek their springs of action *ultra*

montes, outside of the common experience and daily life of man. And I remark about them that they are especially apt to teach wrong precepts, and that even when they command men to do the right things they put the command upon wrong motives, and do not get the things done.

But there are forms of religious emotion which do not thus undermine the conscience. Far be it from me to undervalue the help and strength which many of the bravest of our brethren have drawn from the thought of an unseen helper of men. He who, wearied or stricken in the fight with the powers of darkness, asks himself in a solitary place, 'Is it all for nothing? shall we indeed be overthrown?'—he does find something which may justify that thought. In such a moment of utter sincerity, when a man has bared his own soul before the immensities and the eternities, a presence in which his own poor personality is shrivelled into nothingness arises within him, and says, as plainly as words can say, 'I am with thee, and I am greater than thou.' Many names of Gods, of many shapes, have men given to this presence; seeking by names and pictures to know more clearly and to remember more continually the guide and the helper of men. No such comradeship with the Great Companion shall have anything but reverence from me, who have known the divine gentleness of Denison Maurice, the strong and healthy practical instinct of Charles Kingsley, and who now revere with all my heart the teaching of James Martineau. They seem to me, one and all, to be reaching forward with loving anticipation to a clearer vision which is yet to come—*tendentesque manus ripæ ulterioris amore.*

For, after all, such a helper of men, outside of humanity, the truth will not allow us to see. The dim and shadowy outlines of the superhuman deity fade slowly away from before us; and as the mist of his presence floats aside, we perceive with greater and greater clearness the shape of a yet grander and nobler figure—of Him who made all Gods and shall unmake them. From the dim dawn of history, and from the inmost depth of every soul, the face of our father Man looks out upon us with the fire of eternal youth in his eyes, and says, 'Before Jehovah was, I am!'

THE INFLUENCE UPON MORALITY OF A DECLINE IN RELIGIOUS BELIEF.

FROM 'A MODERN SYMPOSIUM.'

(*In No. 2 of 'The Nineteenth Century.'*)

In the third of the preceding discourses[1] there is so much which I can fully and fervently accept, that I should find it far more grateful to rest in that feeling of admiration and sympathy than to attend to points of difference which seem to me to be of altogether secondary import. But for the truth's sake this must first be done, because it will then be more easy to point out some of the bearings of the position held in that discourse upon the question which is under discussion.

That the sense of duty in a man is the prompting of a self other than his own, is the very essence of it. Not only would morals not be self-sufficing, if there were no such prompting of a wider self, but they could not exist: one might as well suppose a fire without heat. Not only is a sense of duty inherent in the constitution of our nature, but the prompting of a wider self than that of the individual is inherent in a sense of duty. It is no more possible to have the right without unselfishness than to have man without a feeling for the right.

We may explain or account for these facts in various

[1] By Dr. Martineau.

ways, but we shall not thereby alter the facts. No theories about heat and light will ever make a cold fire. And no doubt or disproof of any existing theory can any more extinguish that self other than myself, which speaks to me in the voice of conscience, than doubt or disproof of the wave-theory of light can put out the noonday sun.

One such theory is defended in the discourse here dealt with, and, if I may venture to say so, is not quite sufficiently distinguished from the facts which it is meant to explain. The theory is this: that the voice of conscience in my mind is the voice of a conscious being external to me and to all men, who has made us and all the world. When this theory is admitted, the observed discrepancy between our moral sense and the government of the world as a whole makes it necessary to suppose another world and another life in it for men, whereby this discord shall be resolved in a final harmony.

I fully admit that the theistic hypothesis, so grounded, and considered apart from objections otherwise arising, is a reasonable hypothesis and an explanation of the facts. The idea of an external conscious being is unavoidably suggested, as it seems to me, by the categorical imperative of the moral sense; and moreover, in a way quite independent, by the aspect of nature, which seems to answer to our questionings with an intelligence akin to our own. It is more reasonable to assume one consciousness than two, if by that one assumption we can explain two distinct facts; just as if we had been led to assume an ether to explain light, and an ether to explain electricity, we might have run

before experiment and guessed that these two ethers were but one. But since there is a discordance between nature and conscience, the theory of their common origin in a mind external to humanity has not met with such acceptance as that of the divine origin of each. A large number of theists have rejected it, and taken refuge in Manichæism and the doctrine of the Demiurgus in various forms; while others have endeavoured, as aforesaid, to redress the balance of the old world by calling into existence a new one.

It is, however, a very striking and significant fact that the great majority of mankind who have thought about these questions at all, while acknowledging the existence of divine beings and their influence in the government of the world, have sought for the spring and sanction of duty in something above and beyond the Gods. The religions of Brahmanism and of Buddhism, and the moral system of Confucius, have together ruled over more than two-thirds of the human race during the historic period; and in all of these the moral sense is regarded as arising indeed out of a universal principle, but not as personified in any conscious being. This vast body of dissent might well, it should seem, make us ask if there is not something unsatisfying in the theory which represents the voice of conscience as the voice of a God.

Although, as I have said, the idea of an external conscious being is unavoidably suggested by the moral sense, yet, if this idea should be found untrue, it does not follow that nature has been fooling us. The idea is not in the facts, but in our inference from the facts. A mirror unavoidably suggests the idea of a

room behind it; but it is not our eyes that deceive us, it is only the inference we draw from their testimony. Further consideration may lead to a different inference of far greater practical value.

Now, whether or no it be reasonable and satisfying to the conscience, it cannot be doubted that theistic belief is a comfort and a solace to those who hold it, and that the loss of it is a very painful loss. It cannot be doubted, at least, by many of us in this generation, who either profess it now, or received it in our childhood and have parted from it since with such searching trouble as only cradle-faiths can cause. We have seen the spring sun shine out of an empty heaven, to light up a soulless earth; we have felt with utter loneliness that the Great Companion is dead. Our children, it may be hoped, will know that sorrow only by the reflex light of a wondering compassion. But to say that theistic belief is a comfort and a solace, and to say that it is the crown or coping of morality, these are different things.

For in what way shall belief in God strengthen my sense of duty? *He is a great one working for the right.* But I already know so many, and I know these so well. *His righteousness is unfathomable; it transcends all ideals.* But I have not yet fathomed the goodness of living men whom I know: still less of those who have lived, and whom I know. And the goodness of all these is a striving for something better; now it is not the goal, but the striving for it, that matters to me. The essence of their goodness is the losing of the individual self in another and a wider self; but God cannot do this; his goodness must be something different. *He is infinitely*

great and powerful, and he lives for ever. I do not understand this mensuration of goodness by foot-pounds and seconds and cubic miles. A little field-mouse, which busies itself in the hedge, and does not mind my company, is more to me than the longest ichthyosaurus that ever lived, even if he lived a thousand years. When we look at a starry sky, the spectacle whose awfulness Kant compared with that of the moral sense, does it help out our poetic emotion to reflect that these specks are really very very big, and very very hot, and very very far away? Their heat and their bigness oppress us; we should like them to be taken still farther away, the great blazing lumps. But when we think of the unseen planets that surround them, of the wonders of life, of reason, of love that may dwell therein, then indeed there is something sublime in the sight. Fitness and kinship; these are the truly great things for us, not force and massiveness and length of days.

Length of days, said the old Rabbi, is measured not by their number, but by the work that is done in them. We are all to be swept away in the final ruin of the earth. The thought of that ending is a sad thought; there is no use in trying to deny this. But it has nothing to do with right and wrong; it belongs to another subject. Like All-father Odin, we must ride out gaily to do battle with the wolf of doom, even if there be no Balder to come back and continue our work. At any rate the right will have been done; and the past is safer than all storehouses.

The conclusion of the matter is that belief in God and in a future life is a source of refined and elevated pleasure to those who can hold it. But the foregoing

of a refined and elevated pleasure, because it appears that we have no right to indulge in it, is not in itself, and cannot produce as its consequence, a decline of morality.

There is another theory of the facts of the moral sense set forth in the succeeding discourse,[1] and this seems to me to be the true one. The voice of conscience is the voice of our Father Man who is within us; the accumulated instinct of the race is poured into each one of us, and overflows us, as if the ocean were poured into a cup.[2] Our evidence for this explanation is that the cause assigned is a *vera causa*, it undoubtedly exists; there is no *perhaps* about that. And those who have tried tell us that it is sufficient: the explanation, like the fact, 'covers the whole voluntary field.' The lightest and the gravest action may be consciously done in and for Man. And the sympathetic aspect of nature is explained to us in the same way. In so far as our conception of nature is akin to our minds that conceive it, Man made it; and Man made us, with the necessity to conceive it in this way.[3]

I do not, however, suppose that morality would practically gain much from the wide acceptance of true views about its nature, except in a way which I shall presently suggest. I neither admit the moral influence of theism in the past, nor look forward to the moral influence of humanism in the future. Virtue is a habit,

[1] By Mr. Frederic Harrison.

[2] Schopenhauer. There is a most remarkable article on the 'Natural History of Morals' in the *North British Review*, Dec. 1867.

[3] For an admirable exposition of the doctrine of the social origin of our conceptions, see Professor Croom Robertson's paper, 'How we come by our Knowledge,' in the first number of the *Nineteenth Century*.

not a sentiment or an -ism. The doctrine of total depravity seems to have been succeeded by a doctrine of partial depravity, according to which there is hope for human affairs, but still men cannot go straight unless some tremendous all-embracing theory has a finger in the pie. Theories are most important and excellent things when they help us to see the matter as it really is, and so to judge what is the right thing to do in regard to it. They are the guides of action, but not the springs of it. Now the spring of virtuous action is the social instinct, which is set to work by the practice of comradeship. The union of men in a common effort for a common object—*band-work*, if I may venture to translate co-operation into English—this is and always has been the true school of character. Except in times of severe struggle for national existence, the practice of virtue by masses of men has always been coincident with municipal freedom, and with the vigour of such unions as are not large enough to take from each man his conscious share in the work and in the direction of it.

What really affects morality is not religious belief, but a practice which, in some times and places, is thought to be religious—namely, the practice of submitting human life to clerical control. The apparently destructive tendency of modern times, which arouses fear and the foreboding of evil in the minds of many of the best of men, seems to me to be not mainly an intellectual movement. It has its intellectual side, but that side is the least important, and touches comparatively few souls. The true core of it is a firm resolve of men to know the right at first hand, which has grown out of the strong impulse given to the moral sense by political

freedom. Such a resolve is a necessary condition to the existence of a pure and noble theism like that of the third discourse,[1] which learns what God is like by thinking of man's love for man. Although that doctrine has been prefigured and led up to for many ages by the best teaching of Englishmen, and—what is far more important—by the best practice of Englishmen, yet it cannot be accepted on a large scale without what will seem to many a decline of religious belief. For assuredly if men learn the nature of God from the moral sense of man, they cannot go on believing the doctrines of popular theology. Such change of belief is of small account in itself, for any consequences it can bring about; but it is of vast importance as a symptom of the increasing power and clearness of the sense of duty.

On the other hand there is one 'decline of religious belief,' inseparable from a revolution in human conduct, which would indeed be a frightful disaster to mankind. A revival of any form of sacerdotal Christianity would be a matter of practice and not a matter of theory. The system which sapped the foundations of patriotism in the old world; which well-nigh eradicated the sense of intellectual honesty, and seriously weakened the habit of truth-speaking; which lowered men's reverence for the marriage-bond by placing its sanctions in a realm outside of nature instead of in the common life of men, and by the institutions of monasticism and a celibate clergy; which stunted the moral sense of the nations by putting a priest between every man and his conscience; this system, if it should ever return to power, must be expected to produce worse evils than those which it has

[1] Dr. Martineau's.

worked in the past. The house which it once made desolate has been partially swept and garnished by the free play gained for the natural goodness of men. It would come back accompanied by social diseases perhaps worse than itself, and the wreck of civilized Europe would be darker than the darkest of past ages.

COSMIC EMOTION.[1]

By a *cosmic emotion*—the phrase is Mr. Henry Sidgwick's—I mean an emotion which is felt in regard to the universe or sum of things, viewed as a cosmos or order. There are two kinds of cosmic emotion—one having reference to the Macrocosm or universe surrounding and containing us, the other relating to the Microcosm or universe of our own souls. When we try to put together the most general conceptions that we can form about the great aggregate of events that are always going on, to strike a sort of balance among the feelings which these events produce in us, and to add to these the feeling of vastness associated with an attempt to represent the whole of existence, then we experience a cosmic emotion of the first kind. It may have the character of awe, veneration, resignation, submission; or it may be an overpowering stimulus to action, like the effect of the surrounding orchestra upon a musician who is thereby caught up and driven to play his proper part with force and exactness of time and tune. If, on the other hand, we consider the totality of our own actions and of the feelings that go with them or spring out of them, if we frame the highest possible generalization to express the character of those which we call good, and if we contemplate this with the feeling of

[1] *Nineteenth Century*, October, 1877.

vastness which belongs to that which concerns all things that all men do, we shall experience a cosmic emotion of the second kind. Such an emotion finds voice in Wordsworth's *Ode to Duty:*

> Stern daughter of the voice of God!
> O Duty, if that name thou love,
> Who art a light to guide, a rod
> To check the erring, and reprove;
> Thou who art victory and law
> When empty terrors overawe;
> From vain temptations dost set free
> And calm'st the weary strife of frail humanity!

A special form of each of these kinds of cosmic emotion has been expressed in a sentence by Immanuel Kant, which has been perfectly translated by Lord Houghton:

> Two things I contemplate with ceaseless awe;
> The stars of Heaven, and Man's sense of Law.

For the star-full sky on a clear night is the most direct presentation of the sum of things that we can find, and from the nature of the circumstances is fitted to produce a cosmic emotion of the first kind. And the moral faculty of man was thought of by Kant as possessing universality in a peculiar sense; for the form of all right maxims, according to him, is that they are fit for universal law, applicable to all intelligent beings whatever. This mode of viewing the faculty is clearly well adapted for producing cosmic emotion of the second kind.

The character of the emotion with which men contemplate the world, the temper in which they stand in the presence of the immensities and the eternities, must depend first of all on what they think the world is.

The theory of the universe, the view of things, prevalent at any time and place, will rouse appropriate feelings in those who contemplate it; not the same in all, for temperament varies with the individual, and the same facts stir differently different souls, yet so that, on the whole, the character of cosmic emotion depends on the nature of cosmic ideas.

When, therefore, the inevitable progress of knowledge has changed the prevalent cosmic ideas, so that the world as we know it is not the world which our fathers knew, the oldest cosmic emotions are no longer found to fit. Knowledge must have been in men's possession for a long time before it has acquired the certainty, the precision, the familiarity, the wide diffusion and comprehension which make it fit to rouse feelings strong enough and general enough for true poetic expression. For the true poetry is that which expresses *our* feelings, and not *my* feelings only—that which appeals to the universal in the heart of each one of us. So it has come about that the world of the poet, the world in its emotional aspect, always lags a little behind the world of science, not merely as it appears to the few who are able to assist at the birth of its conceptions, but even as it is roughly and in broad strokes revealed to the many. We always know a little more than our imaginations have thoroughly pictured. To some minds there is hope and renewing of youth in the sense that the last word is not yet spoken, that greater mysteries yet lie behind the veil. The prophet himself may say with gladness, 'He that cometh after me shall be preferred before me.' But others see in the clearer and wider vision that approaches them the end of all beauty

and joy in the earth; because their old feelings are not suited to the new learning, they think that learning can stir no feelings at all. Even the great poet already quoted, whom no science will put out of date, complained of the prosaic effects of explanation, and said, 'We murder to dissect.'

I propose to consider and compare an ancient and a modern system of cosmic ideas, and to show how the emotions suited to the latter have already in part received poetic expression.

In the early part of the fifth century of our era the Neoplatonic philosopher Hierokles was teaching at Alexandria. He was an Alexandrian by birth, and had studied with Proklos, or a little before him, under Plutarch at Athens. He was a man of great eloquence, and of better Greek than most of his contemporaries. He astonished his hearers everywhere, says Suidas, by the calm, the magnificence, the width of his superlative intellect, and by the sweetness of his speech, full of the most beautiful words and things. A man of manly spirit and courage; for being once at Byzantium he came into collision with the ecclesiastical authorities (τοῖς κρατοῦσι) and was scourged in court; then, streaming with blood, he caught some of it in his hand and threw it at the magistrate, with this verse of the Odyssey: '*Here, Cyclops, drink wine, since you eat human flesh!*' For which contempt of court he was banished, but subsequently made his way back to Alexandria. Here he lectured on various topics, foreknowledge, will, and fate, expounding also some of the dialogues of Plato and other philosophical writings.

But the matter of one course of lectures is preserved

to us. It is a commentary on a document in hexameter verse belonging to the Pythagorean scriptures, dating apparently from the third century B.C. These lines were called by Jamblichus the Golden Verses; but Gregory of Nazianzum did them the honour to say they were rather made of *lead*. They are not elegant as poetry; the form of verse seems to have been adopted as an aid to the memory. More than half of them consist of a sort of versified 'duty to God and my neighbour,' except that it is not designed by the rich to be obeyed by the poor, that it lays stress on the laws of health, and that it is just such sensible counsel for the good and right conduct of life as an English gentleman might now-a-days give to his son. We need not be astonished that the step from the Mediterranean to Great Britain, over two thousand years of time, should make no great difference in the validity of maxims like these. We might go back four thousand years further, and find the same precepts handed down at Memphis as the wisdom of a hoar antiquity. 'There's some things as I've never felt i' the dark about,' says Mrs. Winthrop, 'and they're mostly what comes i' the day's work.'

There are curious indications that the point of view of the commentator is not that of the verses themselves. 'Before all things honour the immortal Gods, as they are ordained by law,' begin the verses, with the frank Erastianism of the Greeks, who held that every man should worship the Gods in the manner belonging to his city and country; that matter being settled for themselves by the oracle of the Delphian Apollo. But this did not suit the Neoplatonist of the fifth century, whom the law of his country required to worship images of Mary

and her son (to be sure, they might be adapted figures of Isis and Horus) and the miraculous toe-nails of some filthy and ignorant monk. The law named in the verses could not be that which had scourged and banished a philosopher; so it is explained to mean the demiurgic law, which assigns to the Gods their several orders, the law of the divine nature. We are to honour the immortal Gods, says the commentator, in the order which is assigned to them by the law of their being. For Hierokles there is one supreme deity and three orders of angels—the immortal Gods, the illustrious heroes, and the terrestrial dæmons or partially deified souls of men. The bishops, as we all know, multiplied these numbers by three.

As to the kind of worship, our commentator quotes some old Pythagorean maxims. *You shall honour the God best by becoming godlike in your thoughts. Whoso giveth God honour as to one that needeth it, that man in his folly hath made himself greater than God. The wise man only is a priest, is a lover of God, is skilled to pray.* 'For,' he says, 'that man only knows how to worship who does not confound the relative dignity of worshipful things, who begins by offering himself as the victim, fashions his own soul into a divine image, and furnishes his mind as a temple for the reception of the divine light.' 'The whole force of worship,' he says in another place, 'lies in knowledge of the nature of that which is worshipped.'

(It is interesting to compare this last maxim with the proposition of Spinoza:[1] 'He who clearly and dis-

[1] Qui se suosque affectus clare et distincte intelligit, Deum amat, et eo magis, quo se suosque affectus magis intelligit.'—*Eth.* v. prop. xv. Cf. Affectuum definitiones ad fin. part. iii.

tinctly understands himself and his own emotions, loves God, and that the more, the more he understands himself and his own emotions.' For to understand clearly and distinctly is to contemplate in relation to God, to the cosmic idea. When the mind contemplates itself in relation to God, it necessarily rises from a lower to a higher grade of perfection. Now *joy* is the passage from a lower to a higher grade of perfection, and *love* is joy associated with the idea of an external cause. He, then, that rises to higher perfection in the presence of the idea of God, loves God.)

But it is in the latter portion of the *Golden Verses* that we find a general view of life and of nature assigned as the ground of the precepts which have gone before. There are in all seventy-one lines; of the last thirty-two I venture to subjoin a translation as nearly literal as is consistent with intelligibility.[1]

'Let not soft sleep come upon thy eyelids, till thou hast pondered thy deeds of the day:

'Wherein have I sinned? What work have I done? What left undone that I was bound to do?

'Beginning at the first, go through even unto the last; and then let thy heart smite thee for the evil deed, but rejoice in the good work.

'Work at these commandments, and think upon them; these commandments shalt thou love.

'They shall surely set thee in the way of divine righteousness; yea, by Him who gave into our soul the Tetrad, well-spring of Nature everlasting.

[1] The text followed is that of Mullach, in the *Fragmenta Philosophorum Græcorum*, Paris, 1860, from the prolegomena to which my information is derived.

'Set to thy work with a will, beseeching the Gods for the end thereof.

'And when thou hast mastered these commandments, thou shalt know the being of the Gods that die not, and of men that die; thou shalt know of things, wherein they are diverse, and the kinship that binds them in one

'Know, so far as is permitted thee, that Nature in all things is like unto herself:

'That thou mayest not hope that of which there is no hope, nor be ignorant of that which may be.

'Know thou also that the woes of men are the work of their own hands:

'Miserable are they, because they see not and hear not the good that is very nigh them; and the way of escape from evil, few there be that understand it.

'Like rollers they roll to and fro, having endless trouble; so hath fate broken the wits [1] of mortal men.

'A baneful strife lurketh inborn in us, and goeth on the way with us to hurt us; this let not a man stir up, but avoid and flee.

'Verily, Father Zeus, thou wouldst free all men from much evil, if thou wouldst teach all men what manner of spirit they are of.

'But do thou be of good cheer; for they are Gods' kindred whom holy Nature leadeth onward, and in due order showeth them all things.

'And if thou hast any part with them, and keepest these commandments, thou shalt utterly heal thy soul, and save it from travail.

'Keep from the meats aforesaid, using judgment both in cleansing and in setting free thy soul.

[1] 'My brains are broken.'—Sir Walter Raleigh.

'Give heed to every matter, and set Reason on high, who best holdeth the reins of guidance.

'Then, when thou leavest the body, and comest into the free æther, thou shalt be a God undying, everlasting, neither shall death have any more dominion over thee.'

It is worth while to notice the comment of Hierokles on the self-judgment enjoined in the first of these lines.

'The judge herein appointed,' he says, 'is the most just of all, and the one which is most at home with us; namely conscience itself, and right reason. And each man is to be judged by himself, before whom our bringing-up has taught us to be more shamefast than before any other. (As a previous verse commands; of all men be most shamefast before thyself: *πάντων δὲ μάλιστ' αἰσχύνεο σαυτόν.*) For what is there of which one man can so admonish another, as he can himself? For the free will, misusing the liberty of its nature, turns away from the counsels of others, when it does not wish to be led by them; but a man's own reason must needs obey itself.'

Whether the clear statement of this doctrine of the conscience, *dominans ille deus in nobis*, as Cicero calls it, is originally Stoic or Pythagorean, must be left for the learned to decide. Hierokles, however, says expressly that the image of Reason guiding the lower faculties as the charioteer guides his chariot was derived by Plato from the Pythagoreans.

Very remarkable indeed is the view of Nature set forth in the subsequent verses. 'Know, so far as is permitted thee, that Nature is in all things uniform' (*φύσιν περὶ παντὸς ὁμοίην*). This conception of the world as a great cosmos or order is the primary con-

dition of human progress. In the earliest steps of primitive men in the simplest arts of life there is involved a dim recognition and practical use of it to the extent of its application in that stage. Every step forward is an increase in the range of its application. In the industrial arts, in the rules of health, the methods of healing, the preparation of food, in morals and politics, every advance is an application of past experience to new circumstances, in accordance with an observed order of nature. Philosophy consists in the conscious recognition of this method, and in the systematic use of it for the complete guidance of life. Aberration from it is the death of the rational soul; not, says Hierokles, that it ceases thereby to exist, but that it falls away from harmony with divine Nature and with reason. This fatal falling away brings about endless waste and perversion of strenuous effort; a hoping for things of which there is no hope, an ignorance of what may be; a perpetual striving to clamber up the back stairs of a universe that has no back stairs. The Neoplatonists were not wholly spotless in this regard. They had learned evil things of the Egyptians: magic, astrology, converse with spirits, theurgy, and the endeavour by trances and ecstasies to arrive at feelings and ideas which are alien to the healthy and wakeful mind. And so the uniformity of nature gives our commentator some little trouble, and requires to be interpreted.

'Know *so far as is permitted thee* (ᾗ θέμις ἐστί),' say the verses. 'For we ought not to yield to unreasoning prejudice, and accommodate the order and dignity of things to our fancies; but to keep within the bounds of truth and *know all things as it is permitted*, namely,

as the Demiurgic law has assigned to every one its place.'

So the commentator, reading into the verses more than the writer put there, not without edification. We, then, on our part, may read into them this—that it is not 'permitted' to regard the uniformity of nature as a dogma known with certainty, or exactness, or universality: but only within the range of human conduct, as a practical rule for the guidance of the same, and as the only source of beliefs that will not lead astray. For to affirm any general proposition of this kind to be certainly, or exactly, or universally true, is to make a mistake about the nature and limits of human knowledge. But at present it is a venial mistake, because the doctrine of the nature of human knowledge, *Erkenntniss-theorie*, Ken-lore, is only now being thoroughly worked out, so that our children will know a great deal more about it than we do, and have what they know much better and more simply expressed. It is almost infinitely more important to keep in view that the uniformity of nature is practically certain, practically exact, practically universal, and to make this conception the guide of our lives, than to remember that this certainty, exactness, and universality are only known practically, not in a theoretical or absolute way.

How far away is the doctrine of uniformity from fatalism! It begins directly to remind us that men suffer from *preventible* evils, that the people perisheth for lack of knowledge. 'Miserable are they, because they see not and hear not the good that is very nigh them; and the way of escape from evil, few there be that understand it.' The practical lesson is not that of

the pessimist, that we should give up the contest, recognize that life is an evil, and get out of it as best we may; but on the contrary, that having found anything wrong, we should set to work to mend it; for *the woes of men are the work of their own hands.*

'But be thou of good cheer, for they are of Gods' kindred whom holy Nature leadeth onward, and in due order showeth them all things.'

The expression (ἱερὰ προφέρουσα . . . δείκνυσιν ἕκαστα) belongs to the rite of initiation into the mysteries. Nature is represented as the hierophant, the guiding priest by whom the faithful were initiated into the divine secrets one by one. The history of mankind is conceived as such a mystic progress under the guidance of divine Nature. It has been sometimes said that the ancient world was entirely devoid of the conception of progress. But like most sweeping antitheses between *ancient* and *modern*, *East* and *West*, and the like, when we come to look a little closely into this assertion it becomes difficult to believe that any definite meaning can ever have been assigned to it. Certainly in the matter of physical science there is no case of firmer faith in progress than that of Hipparchus, who having made the great step of determining the solar and lunar motions, and having failed to extend the same methods to the planets, stored up observations in the sure and certain hope that a more fortunate successor would accomplish that work; which indeed was done by Ptolemy. And it is very important to notice that the exact sciences were regarded as the standard to which the others should endeavour to attain, as appears by the commentary on a subsequent passage in these

very verses. On the phrase 'using judgment both in *cleansing* and in *setting free* thy soul,' Hierokles explains that the *cleansing* or *lustration* of the rational soul means the mathematic sciences, and that the upward-leading liberation (*ἀναγωγὸς λύσις*), the freedom that is progressive, is *scientific inquiry*, or *a scientific view of things* (*διαλεκτικὴ τῶν ὄντων ἐποπτεία*), the clear and exact vision of one who has attained the highest grade of initiation. Accordingly, the medical sciences never lost the tradition of progress by continuous observation impressed on them by Hippocrates; and in the Alexandrian museum were trained that galaxy of famous physicians and naturalists which kept the school illustrious until the claims of culture were restored by the Arab conquest. Nor is it possible to deny the conception and practice of political progress to the great jurists of Rome, any more than that of ethical progress to the Stoic moralists. To the best minds, with whatever subject occupied, there was present this conception of divine Nature patiently educating the human race, ready to bring out of her storehouse good things without number in the proper time.

Nor was this hope of continued progress altogether a vain one, if we will only look in the right place for the fulfilment of it. Greek polity and culture had been planted in the East by Alexander's conquests from the Nile to the Indus, there to suck up and gather together the wisdom of centuries and of continents. When the light and the right were driven out of Europe by the Church, they found in the far East a home with the Omaiyad and Abbasside Caliphs, whose reign gave peace and breathing time to the old and young civilization that

was ready to grow. Across the north of Africa came again the progressive culture of Greece and Rome, enriched with precious jewels of old-world lore; it took firm ground in Spain, and the light and the right were flashed back into Europe from the blades of Saracen swords. From Bagdad to Cordova, in the great days of the Caliphate, the best minds had faith in human progress to be made by observation of the order of nature. Here again the true culture was overridden and destroyed by the development of the Mohammedan religion; but not until the sacred torch had been safely handed on to the new nations of convalescent Europe.

If the singer of the *Golden Verses* could have contemplated on these lines the history of the two thousand years that were to succeed him, he would have seen an uninterrupted succession of naturalists and physicians, philosophers and statesmen, all steadily reaching forward to the good things that were before, never losing hold of what had already been attained. And we, looking back, may see that through overwhelming difficulties and dangers and diseases holy Nature has indeed been leading onward the kindred of the Gods, slowly but surely unfolding to them the roll of the heavenly mysteries.

Of course, if we restrict our view to Europe itself, we meet with a far more complex and difficult problem; a problem of pathology as opposed to one of healthy growth. We have to explain the apparent anomaly of two epochs of comparative sanity and civilization separated by the disease and delirium of the Catholic episode.

Just as the traveller, who has been worn to the bone

by years of weary striving among men of another skin, suddenly gazes with doubting eyes upon the white face of a brother, so, if we travel backwards in thought over the darker ages of the history of Europe, we at length reach back with such bounding of heart to men who had like hopes with ourselves; and shake hands across that vast with the singers of the *Golden Verses*, our own true spiritual ancestors.

Well may Greece sing to the earth her mother, in the Litany of Nations:—

> I am she that made thee lovely with my beauty
> From north to south:
> Mine, the fairest lips, took first the fire of duty
> From thine own mouth.
> Mine, the fairest eyes, sought first thy laws and knew them
> Truths undefiled;
> Mine, the fairest hands, took freedom first into them,
> A weanling child.[1]

Let us now put together the view of Nature and of Life which is presented to us by the *Golden Verses*, with a view to considering its fitness for cosmic emotion. We are taught therein to look upon Nature as a divine Order or Cosmos, acting uniformly in all of its diverse parts; which order, by means of its uniformity, is continually educating us and teaching us to act rightly. The ideal character, that which is best fitted to receive the teaching of Nature, is one which has Conscience for its motive power and Reason for its guide. The main point to be observed is that the two kinds of cosmic emotion run together and become one. The macrocosm is viewed only in relation to human action; nature is presented to the emotions as the guide and teacher of

[1] Swinburne, *Songs before Sunrise.*

humanity. And the microcosm is viewed only as tending to complete correspondence with the external; human conduct is a subject for reverence only in so far as it is consonant to the demiurgic law, in harmony with the teaching of divine Nature. This union of the two sides of cosmic emotion belongs to the essence of the philosophic life, as the corresponding intellectual conception is of the essence of the scientific view of things.

There were other parts of the Pythagorean conception of Nature and Man which we cannot at present so easily accept. And even so much as is here suggested we cannot hold as the Pythagoreans held it, because there are the thoughts and the deeds of two thousand years between. These ideas fall in very well with the furniture of our minds; but a great deal of the furniture is new since their time, and changes their place and importance. Of the detailed machinery of the Pythagorean creed these verses say nothing. Of the sacred fire, the hearth of the universe, with sun and planets and the earth's double antichthon revolving round it, the whole enclosed in a crystal globe with nothing outside—of the 'Great Age' of the world, after which everything occurs over again in exactly the same order—of the mystic numbers, and so forth, we find no mention in these verses, and they do not lose much by it, though on that account Zeller calls them 'colourless.' But a remembrance of these doctrines will help us to appreciate the change that has come over our view of the world.

First, then, the cosmos that we have to do with is no longer a definite whole including absolutely all

existence. The old cosmos had a boundary in space, a finite extent in time; for the Great Age might be regarded as a circle, on which you return to the same point after going once round. Beyond the crystal sphere of the fixed stars was nothing; outside that circle of time no history. But now the real universe extends at least far beyond the cosmos, the order that we actually know of. The sum total of our experience and of the inferences that can fairly be drawn from it is only, after all, a part of something larger. So sings one whom great poets revere as a poet, but to whom writers of excellent prose, and even of leading articles, refuse the name:—

I open my scuttle at night and see the far-sprinkled systems,
And all I see, multiplied as high as I can cipher, edge but the rim of the farther systems.
Wider and wider they spread, expanding always expanding,
Outward and outward, and for ever outward.

. . . . . .

There is no stoppage, and never can be stoppage;
If I, you, and the worlds, and all beneath or upon their surfaces, were this moment reduced back to a pallid float, it would not avail in the long run;
We should surely bring up again where we now stand,
And as surely go as much farther—and then farther and farther.
A few quadrillions of eras, a few octillions of cubic leagues, do not hazard the span, or make it impatient;
They are but parts—anything is but a part.
See ever so far, there is limitless space outside of that;
Count ever so much, there is limitless time around that.[1]

Whatever conception, then, we can form of the external cosmos must be regarded as only provisional and not final, as waiting revision when we shall have pushed the bounds of our knowledge further away into time and space. It must always, therefore, have a character

[1] Whitman, *Leaves of Grass*.

of incompleteness about it, a want, a stretching out for something better to come, the expectation of a further lesson from the universal teacher, Experience. And this not only by way of extension of space and time, but by increase of our knowledge even about this part that we know of. Our conception of the universe is for us, and not for our children, any more than it was for our fathers.

But again, this incompleteness does not belong to our conception of the external cosmos alone, but to that of the internal cosmos also. Human nature is fluent, it is constantly though slowly changing, and the universe of human action is changing also. Whatever general conception we may form of good actions and bad ones, we must regard it as quite valid only for ourselves; the next generation will have a slightly modified form of it, but not the same thing. The Kantian universality is no longer possible. No maxim can be valid at all times and places for all rational beings; a maxim valid for us can only be valid for such portions of the human race as are practically identical with ourselves.

Here then we have two limitations to keep in mind when we form our cosmic conceptions. On both sides they are provisional; instead of picturing to ourselves a universe, we represent only a changing part; instead of contemplating an eternal order, and absolute right, we find only a changing property of a shifting organism.

Are we then to be disappointed? I think not; for if we consider these limitations a little more closely, we shall perceive an advantage in each of them.

First, of the external cosmos. Our conception is

limited to a part of things. But to what part? Why, precisely to the part that concerns us. The universe we have to consider is the whole of that knowledge which can rightly influence human action. For, wherever there is a question of guiding human action, there is a possibility of profiting by experience on the assumption that nature is uniform; that is, there is room for the application of science. All practical questions, therefore, are within the domain of science. And we may show conversely that all questions in the domain of science, all questions, that is, which have a real intelligible meaning, and which may be answered either now or at some future time by inferences founded on the uniformity of nature, are *practical* questions in a very real and important sense. For the interrogation of nature, without and within him, is a most momentous part of the work of man on this earth, seeing how all his progress has depended upon conscious or unconscious labour at this task. And although the end of all knowledge is action, and it is only for the sake of action that knowledge is sought by the human race, yet, in order that it may be gained in sufficient breadth and depth, it is necessary that the individual should seek knowledge *for its own sake*. The seeking of knowledge for its own sake is a practical pursuit of incalculable value to humanity. The pretensions of those who would presume to clothe genius in a strait-waistcoat, who would forbid it to attempt this task because Descartes failed in it, and that one because Comte knew nothing about it, would be fatally mischievous if they could be seriously considered by those whom they might affect. No good work in science has ever been done under such conditions; and

no good worker can fail to see the utter futility and short-sightedness of those who advocate them. For there is no field of inquiry, however apparently insignificant, that does not teach the worker in it to distrust his own powers of prevision as to what he is likely to find; to expect the unexpected; to be suspicious of his own accuracy if everything comes out quite as it 'ought to;' but not to hazard the shadow of a guess about the degree of 'utility' that may result from his investigations. Man's creative energy may be checked and hindered, or perverted from the truth; but it is not to be regulated by a pedantic schoolmaster who thought he could whip the centuries with his birch broom.

The cosmos, then, which science now presents to our minds, is only a part of something larger which includes it. But at the same time it is the whole of what concerns us, and no more than what concerns us. Wherever human knowledge establishes itself, that point becomes thenceforward a centre of practical human interest. It, and whatever valid inference can be connected with it, is the business of all mankind.

So also, if we consider the limitation imposed on our idea of the internal cosmos by the changing character of human nature, we shall find that we have gained more than we have lost by it. It is true that we can no longer think of conscience and reason as testifying to us of things eternal and immutable. Human nature is no longer there, a definite thing from age to age, persisting unaltered through the vicissitudes of cities and peoples. Very nearly constant it is, practically constant for so many centuries; but not constant through that range of time which it practically concerns us to know about and

to ponder. But, on the other side, what a flood of light is let in by this very fact, not only on human nature, but on the whole world! It is impossible to exaggerate the effect of the doctrine of evolution on our conception of man and of nature. Suppose all moving things to be suddenly stopped at some instant, and that we could be brought fresh, without any previous knowledge, to look at this petrified scene. The spectacle would be inensely absurd. Crowds of people would be senselessly standing on one leg in the street, looking at one another's backs; others would be wasting their time by sitting in a train in a place difficult to get at, nearly all with their mouths open and their bodies in some contorted, unrestful posture. Clocks would stand with their pendulums on one side. Everthing would be disorderly, conflicting, in its wrong place. But once remember that the world is in motion, is going somewhere, and everything will be accounted for and found just as it should be. Just so great a change of view, just so complete an explanation, is given to us when we recognize that the nature of man and beast and of all the world is changing, is going somewhere. The silly maladaptations in organic nature are seen to be steps towards the improvement or discarding of imperfect organs. The *baneful strife* which *lurketh inborn in us, and goeth on the way with us to hurt us*, is found to be the relic of a time of savage or even lower condition.

It is probable that the doctrine of evolution fills a somewhat larger space in our attention than belongs to its ultimate influence. In the next century, perhaps, men will not think so much about it; they will be paying a new attention to some new thing. But it will

have seized upon their minds, and will dominate all their thoughts to an extent that we cannot as yet conceive. When the sun is rising we pay special attention to him and admire his glories; but when he is well risen we forget him, because we are busy walking about in his light.

Meanwhile, the doctrine of evolution may be made to compensate us for the loss of the immutable and eternal verities by supplying us with a general conception of a *good* action, in a wider sense than the ethical one.

If I have evolved myself out of something like an amphioxus, it is clear to me that I have become *better* by the change; I have risen in the organic scale; I have become more organic. Of all the changes that I have undergone, the greater part must have been changes in the organic direction; some in the opposite direction, some perhaps neutral. But if I could only find out which, I should say that those changes which have tended in the direction of greater organization were good, and those which tended in the opposite direction bad. Here there is no room for proof; the words 'good' and 'bad' belong to the practical reason, and if they are defined, it is by pure choice. I choose that definition of them which must on the whole cause those people who act upon it to be selected for survival. The good action, then, is a mode of action which distinguishes organic from inorganic things, and which makes an organic thing more organic, or raises it in the scale. I shall try presently to determine more precisely what is the nature of this action; we must now merely remember that my actions are to be regarded as

good or bad according as they tend to improve me as an organism, to make me move further away from those intermediate forms through which my race has passed, or to make me retrace these upward steps and go down again. Here we have our general principle for the internal cosmos, the world of our own actions.

What now is our principle for the external cosmos? We consider here again not a statical thing, but a vast series of events. We want to contemplate not the nature of the external universe as it now is, but the history of its changes; not a perpetual cycle of similar events, with nothing new under the sun, but a drama, whose beginning is different from its middle, and the middle from the end. For practical purposes, which are what concern us, the solar system is a quite sufficient cosmos. We have certainly a history of it, furnished to us by the nebular hypothesis; and the truth of this hypothesis is a matter of practical interest, because the failure of the inferences on which it is founded would modify our actions very considerably. Still the great use is to show that the life upon the earth must have been evolved from inorganic matter; for the evolution of life is that part of the history of the cosmos which directly concerns us. Now here we have the enormous series of events which bridges over the gulf between the smallest piece of colloid matter and the human organism; this is our external cosmos. Must we leave it as a series of events? or can we find a general principle by which the series shall be represented as a single event constantly going on? Clearly we can, for the single event is a mode of action which distinguishes organic from inorganic things, and which makes

organic things more organic. We may regard this mode of action as the generating principle which has produced all the life upon the earth.

We arrive thus at a common principle, which at once distinguishes good actions from bad in the internal world, and which has created the external world, so far as it is living. This principle is, then, a fit object for cosmic emotion if we can only get rid of the vagueness of its definition. And it has this great advantage, that it does not need to be personified for poetical purposes. For we may regard the result of this mode of action, extended over a great length of time, as in some way an embodiment of the action itself. In this way the human race embodies in itself all the ages of organic action that have gone to its evolution. The nature of organic action, then, is to personify itself, and it has personified itself most in the human race.

But before we go further two things must be remarked. First, the very great influence of life in modifying the surface of the earth, so great as in many cases to be comparable to the effects of far ruder changes. Thus we have rocks composed entirely of organic remains, and climate changed by the presence or absence of forests. Secondly, although we have restricted our cosmos to the earth in space, and to the history of life upon it in time, there is no necessity to maintain the restriction. For we must suppose that organic action will always take place when the elements which are capable of it are present under the requisite physical conditions of temperature, light, and environment. It is therefore in the last degree improbable that it is confined to our own planet.

In this principle, therefore, we must recognize the mother of life, and especially of human life; powerful enough to subdue the elements, and yet always working gently against them; biding her time in the whole expanse of heaven, to make the highest cosmos out of inorganic chaos; the actor, not of all the actions of living things, but only of the good actions; for a bad action is one by which the organism tends to become less organic, and acts for the time as if inorganic.

To this mother of life, personifying herself in the good works of humanity, it seems to me that we may fitly address a splendid hymn of Mr. Swinburne's, whose meaning if I mar or mistake by such application, let the innocency of my intent plead for pardon with one into whose work it is impossible to read more or more fruitful meaning than he meant in the writing of it:—

Mother of man's time-travelling generations,
Breath of his nostrils, heart-blood of his heart,
God above all Gods worshipped of all nations,
Light above light, law beyond law, thou art.

Thy face is as a sword smiting in sunder
Shadows and chains and dreams and iron things;
The sea is dumb before thy face, the thunder
Silent, the skies are narrower than thy wings.

. . . . . .

All old grey histories hiding thy clear features,
O secret spirit and sovereign, all men's tales,
Creeds woven of men thy children and thy creatures,
They have woven for vestures of thee and for veils.

Thine hands, without election or exemption,
Feed all men fainting from false peace or strife,
O thou, the resurrection and redemption,
The godhead and the manhood and the life.[1]

[1] *Songs before Sunrise.*

Still our conception is very vague. We have only said '*good action* has created the life of the world, and in so doing has personified itself as humanity; so we call it the mother of life and of man.' And we have defined good action to be that which makes an organism more organic. We want, therefore, to know something more definite about the kind of action which makes an organism more organic.

This we can find, and of a nature suitable for cosmic emotion, by paying attention to the difference between molar and molecular movement. We know that the particles even of bodies which appear to be at rest are really in a state of very rapid agitation, called molecular motion, and that heat and nerve-discharge are cases of such motion. But molar motion is the movement in one piece of masses large enough to be seen.

Now the peculiarity of living matter is that it is capable of combining together molecular motions, which are invisible, into molar motions, which can be seen. It therefore appears to have the property of moving spontaneously, without help from anything else. So it can for a little while; but it is then obliged to take molecular motion from the surrounding things if it is to go on moving. So that there is no real spontaneity in the case. But still its changes of shape, due to aggregation of molecular motion, may fairly be called *action from within*, because the energy of the motion is supplied by the substance itself, and not by any external thing. If we suppose the same thing to be true for a complex organism that is true for a small speck of living matter—that those changes in it which are directly initiated by the living part of the organism are

the ones which distinguish it from inorganic things, and tend to make it more organic—then we shall have here the nearer definition of organic action. It is probable that the definition as I have stated it is rather *too* precise—that the nature of the action, in fact, varies with circumstances in the complex organism, but is always nearly as stated.

Let us consider what this means from the internal point of view. When I act from within, or in an organic manner, what seems to me to happen? I must appear to be perfectly free, for, if I did not, I must be made to act by something outside of me. 'We think ourselves free,' says Spinoza, 'being conscious of our actions, and not of the causes which determine them.' But we have seen reason to believe that although there is no physical spontaneity, yet the energy for such an action is taken out of myself—*i.e.* out of the living matter in my body. As, therefore, the immediate origin of my action is in myself, I really am free in the only useful sense of the word. 'Freedom is such a property of the will,' says Kant, 'as enables living agents to originate events independently of foreign determining causes.'

The character of an organic action, then, is freedom —that is to say, *action from within.* The action which has its immediate antecedents within the organism has a tendency, in so far as it alters the organism, to make it more organic, or to raise it in the scale. The action which is determined by foreign causes is one in regard to which the organism acts as if inorganic, and in so far as the action tends to alter it, it tends also to lower it in the scale.

It is important to remember that only a part of the

body of a complex organism is actually living matter. This living matter carries about a quantity of formed or dead stuff; as Epictetus says, ψυχάριον εἶ βάσταζον νεκρόν—'a little soul for a little bears up this corpse which is man.'[1] Only actions originating in the living part of the organism are to be regarded as actions from within; the dead part is for our purposes a portion of the external world. And so, from the internal point of view, there are rudiments and survivals in the mind which are to be excluded from that *me*, whose free action tends to progress; that *baneful strife which lurketh inborn in us* is the foe of freedom—*this let not a man stir up, but avoid and flee.*

The way in which freedom, or action from within, has effected the evolution of organisms, is clearly brought out by the theory of Natural Selection. For the improvement of a breed depends upon the selection of *sports*—that is to say, of modifications due to the overflowing energy of the organism, which happen to be useful to it in its special circumstances. Modifications may take place by direct pressure of external circumstances; the whole organism or any organ may lose in size and strength from failure of the proper food, but such modifications are in the downward, not in the upward, direction. *Indirectly* external circumstances may of course produce upward changes; thus the drying up of axolotl ponds caused the survival of individuals which had 'sported' in the direction of lungs. But the

[1] Swinburne, *Poems and Ballads.* I am aware of the difficulties which beset Dr. Beale's theory of germinal matter, as they are stated by Mr. G. H. Lewes; but however hard it may be to decide what *is* living matter, and what is formed stuff, the distinction appears to me to be a real one, to the extent, at least, of the use here made of it.

immediate cause of change in the direction of higher organization is always the internal and quasi-spontaneous action of the organism.

> Freedom we call it, for holier
> Name of the soul there is none;
> Surelier it labours, if slowlier,
> Than the metres of star or of sun;
> Slowlier than life into breath,
> Surelier than time into death,
> It moves till its labour be done.[1]

The highest of organisms is the social organism. To Mr. Herbert Spencer, who has done so much for the whole doctrine of evolution and for all that is connected with it, we owe the first clear and rational statement of the analogy between the individual and the social organism, which, indeed, is more than an analogy, being in many respects a true identity of process and structure and function. Our main business is with one property which the social organism has in common with the individual—namely, this, that it aggregates molecular motions into molar ones. The molecules of a social organism are the individual men, women, and children of which it is composed. By means of it, actions which, as individual, are insignificant, are massed together into the important movements of a society. Co-operation, or *band-work*, is the life of it. Thus it is able to 'originate events independently of foreign determining causes,' or to act with freedom.

Freedom in a society, then, is a very different thing from anarchy. It is the organic action of the society as such; the union of its elements in a common work. As Mr. Spencer points out, society does not resemble those

[1] Swinburne, *Songs before Sunrise.*

organisms which are so highly centralized that the unity of the whole is the important thing, and every part must die if separated from the rest, but rather those which will bear separation and reunion, because although there is a certain union and organization of the parts in regard to one another, yet the far more important fact is the life of the parts separately. The true health of society depends upon the communes, the villages and townships, infinitely more than on the form and pageantry of an imperial government. If in them there is band-work, union for a common effort, converse in the working out of a common thought, then the Republic *is*, and needs not to be made with hands, though Cæsar have his guns in every citadel. None the less it will be part of the business of the Republic, as she grows in strength, to remove him. So long as two or three are gathered together, freedom is there in the midst of them, and it is not until society is utterly divided into its elements that she departs :—

Courage yet ! my brother or my sister !
Keep on ! Liberty is to be subserv'd, whatever occurs ;
That is nothing, that is quell'd by one or two failures, or any number of failures,
Or by the indifference or ingratitude of the people, or by any unfaithfulness,
Or the show of the tushes of power, soldiers, cannon, penal statutes:
Revolt ! and still revolt ! revolt !
What we believe in waits latent forever through all the continents, and all the islands and archipelagos of the sea ;
What we believe in invites no one, promises nothing, sits in calmness and light, is positive and composed, knows no discouragement,
Waiting patiently, waiting its time.

. . . . . .

When liberty goes out of a place, it is not the first to go, nor the second or third to go,
It waits for all the rest to go—it is the last.

When there are no more memories of heroes and martyrs,
And when all life, and all the souls of men and women are discharged from any part of the earth,
Then only shall liberty, or the idea of liberty, be discharged from that part of the earth,
And the infidel come into full possession.[1]

So far our cosmic conception is external. Starting with organic action, as that which has affected the evolution of life and all the works of life, we have found it to have the character of freedom, or action from within, and in the case of the social organism we have seen that freedom is the organic action of society as such, which is what we call the Republic. The Republic is the visible embodiment and personification of freedom in its highest external type.

But the Republic is itself still further personified, in a way that leads us back with new light to the conception of the internal cosmos. The practice of band-work, or comradeship, the organic action of society, has so moulded the nature of man as to create in it two specially human faculties—the conscience and the intellect. Conscience is an instinctive desire for those things which conduce to the welfare of society; intellect is an apparatus for connecting sensation and action, by means of a symbolic representation of the external world, framed in common and for common purposes by the social intercourse of men. Conscience and reason form an inner core in the human mind, having an origin and a nature distinct from the merely animal passions and perceptions; they constitute the soul or spirit of man, the universal part in every one of us. In these are bound up, embalmed and embodied, all the struggles

[1] Whitman, *Leaves of Grass*, p. 363.

and searchings of spirit of the countless generations which have made us what we are. Action which arises out of that inner core, which is prompted by conscience and guided by reason, is *free* in the highest sense of all; this at last is *good* in the ethical sense. And yet, when we act with this most perfect freedom, it may be said that it is not we that act, but Man that worketh in us. He whose life is habitually governed by reason and conscience is the free and wise man of the philosophers of all ages. The highest freedom, then, is identical with the Spirit of Man—

> The earth-god Freedom, the lonely
> Face lightening, the footprint unshod,
> Not as one man crucified only
> Nor scourged with but one life's rod;
> The soul that is substance of nations,
> Reincarnate with fresh generations;
> The great god Man, which is God.[1]

The social organism itself is but a part of the universal cosmos, and like all else is subject to the uniformity of nature. The production and distribution of wealth, the growth and effect of administrative machinery, the education of the race, these are cases of general laws which constitute the science of sociology. The discovery of exact laws has only one purpose—the guidance of conduct by means of them. The laws of political economy are as rigid as those of gravitation; wealth distributes itself as surely as water finds its level. But the use we have to make of the laws of gravitation is not to sit down and cry 'Kismet!' to the flowing stream, but to construct irrigation works. And the use which the Republic must make of the laws of sociology

[1] Swinburne, *Songs before Sunrise.*

is to rationally organize society for the training of the best citizens. Much patient practice of comradeship is necessary before society will be qualified to organize itself in accordance with reason. But those who can read the signs of the times read in them that the kingdom of Man is at hand.

VIRCHOW ON THE TEACHING OF SCIENCE.[1]

THE jubilee meeting of German naturalists and physicians at Munich last year (1877) was marked by an incident which has deservedly attracted attention in this country. Addresses were delivered to the Association, among others, by three very eminent men, and, as was natural on such an occasion, each of them took the form of a review of the situation of science at this moment. Häckel, of Jena, led the way by a discourse on the present position of the evolution theory; on the nature of the evidence for various parts of it; the bearing of it upon mental science or psychology, upon education, and upon morals. He was followed by Nägeli, of Munich, 'On the Limits of Natural Knowledge,' who pointed out that we have a limited number of senses, and that we cannot deal with things which are too large, or too small, or too far away, or with events which happened too long ago; but that if we will be satisfied with such kind of knowledge as we can get, we do really know something, and may come to know a great deal more.

But the words most listened to and most repeated were undoubtedly those of Virchow, of Berlin, 'On the Liberty of Science in the Modern State.' He recalled the early days of the Association, when it had to meet in secret for fear of the authorities; and he warned his

[1] *Nineteenth Century*, April 1878.

colleagues that their present liberty was not a secure possession, that a reaction was possible, and that they should endeavour to make sure of the ground by a wise moderation, by a putting forward of those things which are established in the sight of all men, rather than of individual opinions. He divided scientific doctrines into those which are actually proved and perfectly determined, which we may give out as real science in the strictest sense of the word; and those which are still to be proved, but which, in the meantime, may be taught with a certain amount of probability, in order to fill up gaps in our knowledge. Doctrines of the former class must be completely admitted into the scientific treasure of the nation, and must become part of the nation itself; they must modify the whole method of thinking. For an example of such a doctrine he took the great increase in our knowledge of the eye and its working which has come to us in recent times, and the doctrine of perception founded upon it. Things so well known as this, he said, must be taught to children in the schools. 'If the theory of descent is as certain as Professor Häckel thinks it is, then we must demand its admission into the school, and this demand is a necessary one.' And this, even although there is danger of an alliance between socialism and the doctrine of evolution.

But, he went on to say, there are parts of the evolution theory which are not yet established scientific doctrines in the sense that they ought to be taught dogmatically in schools. Of these he specially named two: the spontaneous generation of living matter out of inorganic bodies, without the presence of previously living

matter; and the descent of man from some non-human vertebrate animal. These, he said, are problems; we may think it ever so probable that living matter has been formed out of non-living matter, and that man has descended from an ape-like ancestor; we may fully expect that evidence will shortly be forthcoming to establish these statements; but meanwhile we must not teach them as known and established scientific facts. We ought to say, 'Do not take this for established truth, be prepared to find that it is otherwise; only for the moment we are of opinion that *it may be true*.'

There is something, I think, very natural and very charming in this scene. The young apostle is full of faith and hope, he has fought his way, undaunted by little stumbles and disappointments, through great morasses of difficulty, and always he has seen his gospel steadily marching on to its triumphant subjugation of the ideal world; and before this gospel accordingly he summons the practical world to bow down. 'Not so fast,' says the veteran, who, in his time, indeed, has been bold enough, and taken sober men's breath away; but who now marches with careful steps, and is conscious of his balance. 'Don't be quite so sure about it; you will turn everything upside down.' One is glad that on a great occasion both sides had their say, and that the word of caution came last, being prompted by the word of courage; and one hopes that on all similar occasions there may be courage enough to justify a like word of caution.

It is also very natural that this speech should have been a source of great relief and comfort to many who did not want to believe in the doctrine of descent, and

who feared that, somehow, they were going to be made to believe in it. It seemed to them, in Dr. Tyndall's words, that 'the world—even the clerical world—had for the most part settled down in the belief that Mr. Darwin's book (*The Origin of Species*) simply reflects the truth of nature;' and that, on the penalty of appearing somewhat singular, they would have to settle down in the same belief themselves. But here is a very eminent scientific man who says he is not quite sure about it; so the world, having only settled down under the supposed weight of an authority which it is not yet very fond of, begins to unsettle itself again; and one need not be at all singular in saying that there is really nothing in the doctrine of evolution, because it is not yet supported by facts. Indeed, the world has become so much impressed with the importance of the rule that you should not teach as a known fact that which is not a known fact, that we may almost expect to hear a bishop declare from his cathedral pulpit that the authorship of the Fourth Gospel is a doubtful question, and that a man would be rash who fully made up his mind to ascribe it to the apostle John.

It may therefore not seem amiss in one who is no biologist, who is therefore a layman in regard to this question of organic evolution, if he should endeavour to lay to heart the warnings of Virchow, and inquire what practical bearing they have on the state of things in our own country. This is what I now propose to do; but I shall confine myself in the main to the question of school teaching. I speak as a householder to householders, on this matter of grave and common concern: what shall we have taught to our children?

Of all the questions discussed in Virchow's speech, this seems to me the most practical, and the most interesting to us as a people.

For I do not think that we in England have much cause to fear either a reaction which shall stop the mouth of the scientific teacher, or a socialist revolution founded on the doctrine of descent. It is true that there are some among us who seriously dislike 'science,' and who look with dread and suspicion on the teachers of it. I am not attaching importance to the personalities of orthodox polemic, which, having 'no case,' is compelled to 'abuse the plaintiff's attorney.' This symptom is of weight only as a symptom, and as such is understood by the intelligent public. But there are men high in literature, in statesmanship, and in art, whose good opinion, founded on knowledge, every man of sense must count desirable, who yet withhold that good opinion from the scientific teacher and the work that he is doing. Notwithstanding this fact, I have no fear that the attitude of mind of these men will be intensified, or will become more general; because it seems to me to be clearly traceable to two circumstances, both of which are disappearing. I mean that there are faults on both sides, and that both faults are being mended.

The first fault is on the side of the scientific student; and yet it is not altogether *his* fault, because it comes of the great change which is passing over our educational system. We have all been learning science—that is, organized common sense—at school for some centuries, and did not know what it was. But of recent times our science has received enormous additions,

partly new sense, partly fresh organized; and these have now to be taught. The first generation of teachers of the new science could naturally not learn it in places where the old science, which we called a liberal education, was to be learned. Some of them learned both, with much labour, and searching, and picking up out of stray corners; but some went without a liberal education altogether. And perhaps a few of these, when they found what a demand there was for them and how important they were, may have fallen into a mistake, and taken their half- or quarter-culture for a whole culture. Now when a man not only mistakes his half- or quarter-culture for a whole culture, but thinks that the culture which he does not possess is silly and worthless, then people who have received a liberal education are apt to think him a bore. And it would be a hard matter to prove them altogether in the wrong.

But this race, which bores a few and educates the many, is patiently and surely exterminating itself. As the new science makes itself at home in the school-house of the old, as it is more taught and in a more civilized manner, the mind of the student balances itself, and recovers its sense of proportion. Exact observation goes naturally enough with justice and simplicity of statement; the great inductions of human life and feeling lighten up by resemblance and contrast the great inductions of physics. Dynamics and Prose Composition have met together; Literature and Biology have kissed each other. Perhaps not yet, but the good time is coming. And in that time every scientific teacher will have received such a many-sided culture, and will be no longer a bore to anybody. Above all, he will

have studied that History of Culture itself, which is the great unifier and justifier and purifier of all our teaching.

The other fault is on the side of those who dislike the new science; it is the fault of being profoundly ignorant of it. No public school boy thinks a man uncanny because he knows a great deal of Greek; no member of Parliament imagines that a careful study of ancient history, or even a revolutionary view about the *Iliad*, might become a dangerous ally of socialism. It is because he has learned a little Greek himself, and knows what it is like. But if a man has morphology at his fingers' ends, or is profound about organic radicles, that is a man to beware of. There is no knowing what theories he does not secretly foster. Or else he is a mere impostor, and gets a great reputation for pottering away at some silly trifles, being really no better than an official in the Herald's Office: so hinted some irreverent young scapegrace in the prologue to the Westminster Play. Now it is clear that a statesman who thinks a decimal coinage means the keeping of shilling and pence accounts in terms of decimal fractions, or a musician who really sees no difference between Graham Bell's telephone and Wheatstone's telephonic concert, may well be expected to misjudge exact students, and their studies, and their aims. But in the good time coming, when 'there shall be no Member of Parliament who does not know as much of science as a scholar in one of our elementary schools,' when also benevolent old ladies may be expected to know one end of a guinea-pig from the other, all this will be changed. The man of science will be no more uncanny than the

Greek scholar is now. And we may be quite sure that the average Englishman is not going to see a man bullied for merely knowing a little more of what he himself learned a little of at school. When he has learned a little science himself, and knows what it is like, he will have, it is true, a less superstitious reverence for the authority of the investigator; but then also he will regard him as a citizen, having as good a right to be trusted and respected, and to say his say upon matters of common interest, as anybody else.

Such distrust or dislike of science, then, as is to be found among us, is due to circumstances which are rapidly disappearing, to misunderstandings and imperfect training, and not to that which alarmed our Prussian colleague, a tendency in the expounders of scientific doctrine to make too sure of things, to put forward as known fact that which is not yet known fact, but only conjecture. Indeed, our own scientific teachers, notably Huxley and Tyndall, have for years been impressing upon us this very thing, by example and precept, in season and out of season—if indeed it is possible for such warning to be out of season. And to their testimony I shall hope to return presently.

As to that other fear of Virchow's, that some caricature of the true doctrine of evolution may become a dangerous weapon in the hands of the socialist, it is a thing somewhat difficult for us to understand. We have a way of suspecting that when socialism is dangerous, somebody or other is being badly treated. We can conceive that it should cause uneasiness to a repressive and meddling protectionist Government. But in this country, where it would probably mean a kind

of alliance between co-operative stores and that very respectable institution, the Metropolitan Board of Works, we cannot undertake to be much alarmed about it. Before any socialist measure could enter into practical politics at all, it would have so far to commend itself to the country as to be supported by a considerable number of votes in the House of Commons; and a measure which can do that is a thing not to be shuddered at, but to be calmly discussed.

What really remains for us to consider, then, as of English interest, is, as I said before, that question about the teaching of our children. The principle laid down by Virchow I shall assume as the basis of the discussion: *we ought not to teach to little children, as a known fact, that which is not a known fact.* And the questions to be discussed are, in what respects this canon is disobeyed or in danger of being disobeyed: and what means we should adopt that our system of teaching may be more perfectly conformed to it. It seems to me that the second question answers itself in the process of considering the first one. I shall therefore now proceed to those doctrines which, in Virchow's view, are in danger of being taught with an assurance which is in advance of the actual evidence for them.

And first, let us consider that very important doctrine of the descent of man from some non-human ancestor. 'There are, at this time, few students of nature who are not of opinion that man stands in some connexion with the rest of the animal world, and that such a connexion may possibly be discovered, if not with the apes, yet perhaps, as Dr. Vogt now supposes, at some other point.' Notwithstanding this, Virchow says:

'We cannot teach, we cannot pronounce it to be a conquest of science, that man descends from the ape or any other animal.' He bases this decision upon the absence of such evidence from palæontology in the case of man as is found in the case of the horse. The horse (asses and zebras being included under this name) is a one-toed beast, thereby differing from all other mammals; but, as he has many points showing relationship with them, it is probable that he is descended from a five-toed ancestor. The problem is to find this ancestor. There is no trace of him in the quaternary strata. If the naturalist were confined to the evidence of those strata, and were not particularly careful of his logic, he might 'declare that every positive advance which we have made in the domain of prehistoric hippology has actually removed us further from the proof of such a connexion.' The doctrine of the descent of the horse from a five-toed ancestor would, in fact, rest upon other grounds than the actual discovery of the ancestral form. But the ancestor of the horse has been found in the tertiary strata. He has three toes in the more recent strata, and four toes in the earlier; and, curiously enough, the complete series is found in America, where there were no horses at the time of its discovery by Europeans. Now Man, on the other hand, is a complex-brained animal, differing in this way and in some others from all other mammals; but since in other respects his whole structure shows relationship with them, and especially with the apes, it is probable that he is descended from an ancestor with a simpler brain and a structure generally bearing more resemblance to the common Simian type. The problem is to find this ancestor.

There is no trace of him in the quaternary strata, because the quaternary men are still men so far as their bony structure is concerned, and we have no evidence about the complexity of their brains, the pointedness of their ears, or the hairy covering of their bodies. Nor, as yet, has any decisive discovery been made of the remains of man, or of any sufficiently man-like animal to count as his ancestor, in the tertiary strata. Until we find the missing link, says Virchow, the descent of man from an ape-like ancestor is not a conquest of science. When we do find the missing link, it will be a conquest of science.

It will naturally, I think, strike anyone who, though a layman, has gained a certain amount of secondhand knowledge of this subject from books, that in this view of the two cases the evidence of fossils is made rather too much of, while other kinds of evidence are wholly ignored. It is a bold thing to criticise the judgment of a pathologist upon general doctrines of biology, when one is oneself not a biologist in any respect. I will therefore shelter myself under authority.

'When we confine our attention to any one form (says Darwin) we are deprived of the weighty arguments derived from the nature of the affinities which connect together whole groups of organisms—their geographical distribution in past and present times, and their geological succession. The homological structure, embryological development, and rudimentary organs of a species, whether it be man or any other animal, to which our attention may be directed, remain to be considered; but these great classes of facts afford, as it appears to me,

ample and conclusive evidence in favour of the principle of gradual evolution.'[1]

For example, it happens that the missing link between man and the anthropoids has not yet been found; but there is a Miocene link which bridges a greater gulf between two other families of apes.[2] So that kinds of evidence may exist in regard to an order of animals which are wanting in the case of an individual family of the order. But both the general analogy of Nature, and the three great classes of facts considered by Darwin in the special case of Man, are apparently reckoned by Virchow as of no practical weight, until the bones of the missing link are safe in the glass cases of a geological museum. I say *apparently*, because it would be insulting a great man to suppose that he really held such an opinion, which, moreover, is inconsistent with the preface to the English translation of his speech. In fact, this admirable speech, in so many ways like that of a cabinet minister reassuring his Opposition, contains more than one passage which, especially when isolated and printed in capitals, it is easy for the Opposition to interpret in a sense more favourable to its own views than that which the speaker had in his mind.

Not only, however, are important kinds of evidence left out of count, but as it seems to me—under guidance, as before—the cogency of the evidence from fossils is somewhat overrated. We must be very careful not to be too sure of these conclusions, lest we should teach as established results of science what are, after all, remote and precarious inferences.

[1] Preface to *Descent of Man*.

[2] *Descent of Man*, i. 197.

'We must recollect (says Huxley) that any human belief, however broad its basis, however defensible it may seem, is, after all, only a probable belief, and that our widest and safest generalizations are simply statements of the highest degree of probability. Though we are quite clear about the constancy of the order of Nature, at the present time, and in the present state of things, it by no means necessarily follows that we are justified in expanding this generalization into the infinite past, and in denying, absolutely, that there may have been a time when Nature did not follow a fixed order, when the relations of cause and effect were not definite, and when extra-natural agencies interfered with the general course of Nature.'[1]

The fact is, we are not absolutely and theoretically certain that these old three-toed and four-toed horse-bones were not made, on purpose to deceive us, by the devil; himself, according to Cuvier, a horned and hoofed, and therefore graminivorous animal, with more than one toe on the hinder limb.[2]

This kind of tangible evidence, which gives us something definite to lay hold of, is peculiarly apt to produce conviction without being properly understood. 'Is it really true that our horses are descended from an ancestor with three toes, who lived a long time ago?' 'Why, of course it is; here's his hock.' It is something like what occurs in the stage-plays, when somebody rushes in to the hero, and says: 'Take these papers and guard

[1] *American Addresses*, p. 3.

[2] The devil is said to have appeared to Cuvier and threatened to eat him. 'Horns? Hoofs?' said Cuvier. 'Graminivorous. Can't eat me.' 'All flesh is grass,' replied the devil, with that fatal habit of misapplying Scripture which has always clung to him.

them carefully; they prove that you are a prince.' The sight of the bundle neatly done up in red tape produces conviction in a moment. But we subsequently reflect that it may be a somewhat delicate and difficult matter to prove by the aid of papers that a man is himself or anybody else; and that there are other methods of establishing personal identity, which are not less valid in the courts.

I am not disparaging this palæontological evidence for the descent of the horse, or saying a word inconsistent with Huxley's conclusion that it is demonstration, in the only sense in which demonstration can apply to an historical fact. What I wish to point out is that it contains many steps of reasoning which are rather difficult to the apprehension of anyone who is not a specialist, and which involve considerations somewhat abstract and remote from the tangible facts on which they are founded. The succession of strata in time, and the mode of their deposition, especially the relations of European strata with American; these, and some other doctrines of geology, are involved in the argument. Now, however certain they may be, the evidence upon which they are established is circumstantial and remote. It is easy enough to the geologist, who is accustomed to it, but it does require special study to master it fully. And there is no trace whatever of these difficulties in the statement 'Here's his hock.' Convincing as that statement is, it does not carry along with the conviction a fair estimate of the evidence on which it is based.

With this consideration in mind, let us compare again the evidence for the descent of man with that for the descent of the horse. The generation of men of

any given race now existing is descended from parents who on the average differed imperceptibly from themselves. This has not gone on for ever, because physical evidence proves a beginning to the present state of the earth. Were the first men also the offspring of parents who differed imperceptibly from themselves, yet so that the imperceptible difference came just where we draw the line between man and not-man? Such a line would of course be arbitrary, but we may suppose a certain hundred generations, the change in each being imperceptible, but still such that we should call the first not-men and the last men. This is the supposition of a non-human ancestor, as made by the evolutionist. If this supposition is rejected, the first men may have originated (1) from parents differing largely from them in structure; (2) from non-living matter, or (3) from non-existence, being men from the moment they began to be. We are not bound to make any supposition at all about the origin of the first men; but if we do make any supposition, it must be one of these.

Suppose, however, that we want not merely to make a supposition, but to infer from the facts before us what actually happened. Then we must make the assumption that there is some sort of uniformity in nature. Without this we cannot infer at all, for inference consists in transferring the experience which we have had under certain conditions to events happening under like conditions, of which we have not had experience. It is true that we cannot be absolutely sure of the uniformity of nature, or that our present conception of it is right: but still it is the only thing we have to go upon. Human knowledge is never absolutely and theoretically

certain, but a great deal of it is practically certain, which is all we want.

Now the production of man from non-living matter, or the coming of any kind of matter into existence out of nothing, are things so entirely without parallel in our existing experience that we cannot infer them unless our experience entirely changes its character. If clay or mould would form itself into a human body a few times, we might learn something about the conditions under which such a transformation takes place, which would enable us to infer that it had taken place before. If matter would occasionally come into existence out of nothing, we might say what kind of matter was most likely to do such a thing; whether buttons or sovereigns were most gifted with this faculty, and so on. But even so, some time must elapse before we could infer, because our whole conception of the order of things would be turned topsy-turvy.

If, therefore, we are to infer anything at all about the origin of the first men, we must infer that they descended from non-human ancestors. What sort of ancestors these were, is, in the present state of knowledge, matter of conjecture merely. To guide this conjecture, we have 'the homological structure, embryological development, and rudimentary organs' of existing men. The evidence of this kind set forth by Darwin seems to point with very great probability to an ancestor more ape-like than man. Still these indications are not so clear and unmistakable that a *less* ape-like ancestor, as Vogt supposes, would be inconsistent with the uniformity of nature. We are dealing with a long series of similar events, the descent of each successive generation

from one very like it; and though each event is an example of what occurs habitually in our experience, yet the effect of the whole series of such events is something of which we can only get knowledge by means of palæontological evidence. We can only, therefore, infer with a very moderate amount of probability that men are descended from this sort of animal or that sort of animal. *This* is the point which will be set at rest by the missing link. But I venture to think that the evidence for the descent of man from *some* non-human ancestor will be but very slightly strengthened by that discovery; and that it is now not perceptibly less cogent than that for the descent of the horse.

For observe that each alike depends on the assumption of the uniformity of Nature. That being given, the descent of man follows from the originally fluid condition of the earth, proved by physical observation and reasoning. Failing that, the evidence for the descent of the horse vanishes into thin air. It is not the least bit more likely that man arose out of the dust of the earth than that the devil made the American horse-bones. Worse than this, quaternary man goes too. 'Quaternary man,' says Virchow, 'is no longer a problem, but a real doctrine.' But how do you know that the devil did not make the fossil men and all the flint implements? This also is quite as likely as that a human body was ever formed by the direct transformation of non-living matter.

'Well then,' I hear my anxious friend say, with a sigh of relief, 'we need not believe even in the antiquity of man, or the evolution of horses. They are all doubtful together.' My good soul, no student of science wants

you to believe anything unless you understand the nature of the evidence for it, and then only to the extent which is warranted by the evidence. There is no occasion for you to form an opinion about these questions. You need have no fear of being singular. There is always the defence of the ensign who was asked if he had seen *Punch*: 'Well, you know, the fact is, I am not a reading man.' But if you wish to form an opinion, there are many excellent manuals in which you may learn the nature of the evidence and the methods of reasoning on which such an opinion should be based. If your opinion should be adverse to the views held by other scientific students, you will do great service by stating your objections. Do not suppose for a moment that we want you to believe on any other terms.

But what we do hope, for your sake, is this: that you will not allow any dishonest person to persuade you to *dis*believe strongly in the doctrine of evolution, because Virchow has admitted that certain parts of it are not yet absolutely proved. It is one thing to believe that a doctrine is false, and quite another thing to admit a theoretical doubt about it.

I say a *theoretical* doubt, because it is a doubt founded on the necessary imperfection of all human knowledge, and not on any practical defect of the evidence. For a doubt precisely similar in kind, though rather greater in degree, attaches to the statement that the Russians took Plevna last year. The evidence for the truth of this statement is, I admit, very strong, and I suppose no sane man would be disposed to question it for a moment. We have the testimony of all the newspaper correspondents, the course of subsequent events, the special

information of the Government, and literally a whole army of witnesses besides. Still, the Russians may have been one and all under a continuous hallucination, and be even now in imminent danger from Osman Pasha. Or those rascally papers may have laid their heads together to deceive the whole British nation, down to this hour. Either of these suppositions is a great deal more likely than that the devil made the old horse-bones, or that clay was transformed into a human body. To be sure, they contradict our experience of the uniformities of human action to such an extent that we cannot seriously entertain them. But the uniformities of human action are known with far less accuracy and completeness than the uniformities which characterize the generation of living bodies. One man under an hallucination is common enough; one newspaper wrong in its facts is well within our experience. So that we have something to go upon in conceiving a widespread delusion. But a man without any mother at all, a real son of the soil, is a thing our experience gives us no help towards conceiving.

If you went to a man of the world with this doubt about Plevna, urging upon him that newspapers were often mistaken, and begging him to consider it in buying stocks, he would either take you for a lunatic and humour your fancy, or he would say: 'Don't be so silly; I have no patience with you.' But the student of science is obliged to have a great deal of patience, and desires to have more.

It seems, then, that the difference between the doctrines of the descent of horses and of the descent of men is not that one is a known fact and the other a con-

jecture, because each of them is practically as certain as such a doctrine can be, though subject to the theoretical doubt which attaches to all human knowledge. And yet there certainly is a great difference between the highly abstract and general considerations which go to establish the one, and the more concrete, but still rather difficult, arguments which prove the other. The evidence in the two cases appeals to two different classes of minds. The inference from a modern horse-bone to the horse whose bone it was is a tolerably easy one, which can be brought home to many minds. From a fossil bone to the ancient animal is a more remote inference, which was at first made with considerable difficulty; yet still any person of ordinary intelligence may be expected to grasp it. Then the geological inferences, from stratified rocks to the sea or river which deposited them, from successive position to successive age, and so on, may have their way smoothed by concrete examples so as to carry their due weight without much mental strain. The biological inferences which connect the modern horse with his fossil representative, based on the structure of corresponding parts and the development of the colt, involve reasoning of a rather more abstract kind. But the whole of this evidence may be fairly presented to a mind which is still incompetent to form that general conception of the uniformity of nature which makes the directly inorganic origin of man a supposition not to be seriously entertained for a moment. To grasp the idea of any law of nature requires a considerable effort of abstraction, and that the idea may be of any real use it must be founded on acquaintance with the facts that come under the law. The general con-

ception of law which is contravened by the supposition in question has to be abstracted from a knowledge of many different laws, dynamical, physical, chemical, biological. This conception, therefore, implies a very wide and many-sided training in facts, a very deep and thorough training in logic, as its foundation. Much education is required to enable the learner really to estimate the evidence for the many-toed horse; much more is wanted for the clear comprehension of the evidence for the simpler-brained man.

Here the education question, which has been underlying our whole discussion, is brought to the front. It is clear that the evidence for these doctrines cannot be taught until a late period in education. What are we to do in the earlier periods? Shall we say: 'Horses had three-toed and four-toed ancestors; by-and-by you will learn how this was found out. We think, but are not quite sure, that men had simpler-brained ancestors; by-and-by you will learn why we think so'?

It seems to me that this is the very worst thing we can do; that if we say this, we shall not only confuse the child's head at the time with abstractions which it is impossible that he should really grasp, but we shall effectually prevent him from learning them properly in the future. The true rule, I believe, is this: *Before teaching any doctrine, wait until the nature of the evidence for it can be understood.*

This appears at first sight a very hard thing to do. Yet it is really involved in Pestalozzi's great principle that children should be made to find out things for themselves. To make clearer the reasons for it, I will consider a case which has the advantage of not being at

the present moment in controversy; the case of the teaching of chemistry. Suppose we were to begin teaching chemistry by saying that carbon is made up of atoms which have four hooks or hands by which they can hold on to other atoms; that oxygen atoms have two hooks, and hydrogen atoms one. Consequently we can hook two hydrogen atoms to an oxygen atom, and this makes water; or we can hook two oxygen atoms to a carbon atom, making carbonic acid; or we can hook four hydrogen atoms to a carbon atom, making marsh-gas. Then we should utterly confuse the learner's mind, and prevent him from learning chemistry afterwards. These statements belong to the doctrine of atomicities. Nobody doubts that these statements represent, in highly metaphorical language, real facts of chemical action; only Sir Benjamin Brodie says that since the hydrogen atoms occur always in even numbers in compounds made of carbon, oxygen, and hydrogen, we ought to fasten them together in pairs, and call each pair an atom with two hooks. What sort of thing we should find, if we knew all about these atoms, answering to the metaphor of the hooks, nobody knows. Without a knowledge of the facts which they symbolize, these statements are mere useless nonsense in anybody's mind. They are worse than useless; for they make him think he knows the facts, and so prevent him from really getting to know them.

On the other hand, we may follow Dr. Williamson's method, show the children how to make carbonic acid, and then pour it on a candle to put it out; burn hydrogen to produce water, and so forth. When a few of the commoner substances are real things to them, whose

properties they are familiar with, they may learn to weigh and measure. Then the law of definite proportions becomes legitimate teaching, and the law of gaseous volumes. It is only necessary to verify these in a few cases, that the *nature* of the evidence for them may be understood.

Here arises a typical question. How, at this point, shall we deal with the doctrine of molecules? The chemical evidence for it may now be clearly understood; but the chemical evidence leaves it still a hypothesis. It becomes quite clear that the hypothesis explains the facts, and links them together: but it does not become clear that no other hypothesis will explain the facts. I think there is every reason why it should be taught *as a hypothesis*; there are materials in the pupil's mind for estimating the value of the hypothesis in making the facts clear to him, and also for understanding why, at present, it is *only* hypothesis. And I further think that, at this stage, no great harm will be done by telling him that when he has learned enough about heat and motion, he will find the hypothesis turned into a demonstrated fact.

The doctrine of atomicities depends upon the various combinations of the same set of elements with one another. The facts on which it is based may be described without introducing any totally new conceptions; the *nature* of the evidence for it may therefore be understood by a pupil at this stage, without any further experiment. I am not, of course, speaking of the training of a specialist, but of that which should form a part of general culture.

Of these two methods of teaching, there can be no

doubt that the latter will commend itself to the common sense of every reasonable man. It insures that the pupil shall learn to *do* things, that is, either to deal practically with certain objects, or to use in thinking certain conceptions; not to think he knows things of which he is really ignorant. And all the time it cultivates a habit of accepting beliefs on the strength of the evidence for them, of preferring true and honest knowledge to sham knowledge. And it secures us against the teaching, as known fact, of that which is not known fact. The only danger in this respect is in the doctrine of molecules; and here we must impress very carefully on our teachers that they should not miss the important lesson in logic and in scientific procedure involved in the conception of a hypothesis, and in recognizing the imperfection of the evidence which fails to exclude all other hypotheses.

Now let us go back from this chemical doctrine of atomicities to the doctrine of evolution. In what form shall we have the doctrine of evolution taught to our children? Certainly not as a dogma to be accepted on the authority of the teacher, evidence for which may be forthcoming afterwards. Certainly not at all until our children are competent to understand the nature of the evidence for it. Certainly not, therefore, first in its most general form, and afterwards in special applications; but first in those special cases where the evidence is of the simplest kind, most closely related to the facts; and then, as a consequence of the comparison of these cases, the general doctrine may suggest itself.

Nevertheless, the teacher, knowing what is to come in the end, may so select the portions of various subjects

which he teaches at an earlier stage that they shall supply in a later stage a means of understanding and estimating the evidence on some question of evolution. He may, for instance, pay special attention to hands and feet when he is teaching biology, because these parts are of great importance in the questions of the evolution of the horse and of the relationship of man with the apes. Or in teaching sociology, which is all about papa and mama, clothes, houses, shops, policemen, halfpence, and such like, he may specially single out those points in which civilized folk differ from barbaric and savage folk, in order to prepare the way for the historic and pre-historic evidence which proves that we are a risen race and not a fallen one. In other cases the doctrine of evolution may guide the teacher in his methods. So much as the psychologist may already infer with safety about the evolution of mind, will lead him to found all abstract notions on previously formed concrete ones; to build his houses out of carefully made bricks, instead of trying to pull bricks out of castles in the air. And he will endeavour to give clearness and solidity to the dawning moral sense by leading to the easy observation that the affairs of the nursery or the Kindergarten cannot go on unless we tell the truth and let alone other folk's things. The affairs should of course be such that a failure in them would seem to the child a calamity too portentous to be thought about.

In fact, as Häckel says, the effect of the doctrine of evolution upon teaching and the methods of teaching cannot fail to be enormous and widespread, quite in-

dependently of the direct teaching of any portions of the doctrine itself.

Let us now go on to examine, in respect of their fitness for education, certain other doctrines mentioned by Virchow; taking next the doctrine of Spontaneous Generation.

'If you ask me (says Tyndall) whether there exists the least evidence to prove that any form of life can be developed out of matter independently of antecedent life, my reply is that evidence considered directly conclusive by many has been adduced, and that were we to follow a common example and accept testimony because it falls in with our belief, we should eagerly close with the evidence referred to. But there is in the true man of science a desire stronger than the wish to have his beliefs upheld; namely, the desire to have them true. And this stronger wish causes him to reject the most plausible support, if he has reason to suspect that it is vitiated by error. Those to whom I refer as having studied this question, believing the evidence offered in favour of "spontaneous generation" to be thus vitiated, cannot accept it. They know full well that the chemist now prepares from inorganic matter a vast array of substances, which were some time ago regarded as the sole products of vitality. They are intimately acquainted with the structural power of matter, as evidenced in the phenomena of crystallization. They can justify scientifically their *belief* in its potency, under the proper conditions, to produce organisms. But in reply to your question, they will frankly admit their inability to point to any satisfactory experimental proof

that life can be developed, save from demonstrable antecedent life.'[1]

What is the justification for this *belief* that non-living matter can, under proper conditions, produce organisms?

There is a substance called *acetylene*, the molecule of which is made of two atoms of carbon, holding together by two hooks from each, and four atoms of hydrogen each holding on by its one hook to a carbon atom. It is made by driving hydrogen between the tremendously hot carbon points of an electric light; directly, therefore, from the elements. If we make acetylene pass through a red-hot tube, we shall get what is called *benzene*. A molecule of benzene is a game of round-the-mulberry-tree played by six carbon atoms, each one holding by two hooks to its right-hand neighbour and one to its left, while it keeps the remaining hook for a hydrogen atom. It is therefore made of *three* molecules of acetylene, each of which has dropped two hydrogen atoms in order to join hands with the other two molecules. How does this molecule of benzene get made out of the three molecules of acetylene?

There are two answers. If anybody likes to assert that benzene can never be made out of acetylene without the presence of pre-existing benzene, it is impossible to disprove his statement. We should have no means of discovering the presence of two or three molecules of benzene vapour in the original hydrogen that we made the acetylene of. It is known that the first step is often a difficulty in the formation of chemical compounds, and that when the process has once begun, the new com-

[1] *Belfast Address.*

pound has the property of assisting the formation of its like. Nobody knows why this is.

No chemist, however, will, as a matter of fact, make this supposition about benzene. It is generally held that the benzene molecule is formed by the collision of three acetylene molecules in favourable positions. This collision is a *coincidence*. Each molecule meets another molecule many millions of times in a second; but I am not aware that anybody has calculated the number of times it meets two other molecules at once. We must know a great deal more of the constitution of atoms before we can calculate what proportion of these triple collisions is favourable to the formation of a benzene molecule; but there can be no doubt that the coincidence takes place an enormous number of times per second in every cubic centimetre of the gas, because a perceptible quantity of benzene is obtained.

There is another substance which can be made out of six carbon atoms and six hydrogen atoms, by fastening them together in a different way. I forget the name of it, but it is an unstable and explosive substance, which breaks itself up on the slightest provocation. We do not find this mixed up with the benzene, although the coincidence which formed it may have occurred quite as often as that which formed benzene. It becomes extinct because it is not adapted to the conditions.

On the other hand, we do find some more complex compounds mixed up with the benzene. These may have been partly made by collision of benzene molecules with acetylene molecules: partly by *coincidences* of a more elaborate character, such as the collision of four or five acetylene molecules. These are all *stable*; that

is to say, they are suited to the conditions, and therefore they survive.

Observe, then, that in this very simple case of the formation of an organic body (in large quantities benzene is always prepared from coal-tar) it is produced by a coincidence, and preserved by natural selection

If we take thirteen carbon atoms instead of six, and combine them only in the simplest ways, so as to form an open chain with branches, it has been calculated by Cayley that 799 compounds are possible. How many of these are stable at a given pressure and temperature, nobody knows. In a gaseous mixture of paraffins, the *coincidence* necessary to form each one of them may occur many thousand times a second. Only those can survive which are stable under the given conditions. Such natural selection determines, for example, the compound ethers which go to make up the flavour of a pear.

Now those persons who believe that living matter, such as protein, arises out of non-living matter in the sea, suppose that it is formed like all other chemical compounds. That is to say, it originates in a coincidence, and is preserved by natural selection. Only in this case the coincidence is of the most elaborate and complex character. I once saw an estimate of the number of carbon atoms in a molecule of albumen. I cannot now lay my hands on the book in which I found it, but there were three figures in it. I do not believe, on the strength of that estimate, that there are over a hundred carbon atoms in a molecule of albumen; because, from the nature of the substance, I cannot imagine any evidence on which it might be securely

founded. But there can be no doubt that all the forms of living matter are enormously complex in chemical constitution. Now there may, of course, be half-way houses, less complex forms out of which they may be built up, just as acetylene forms a half-way house to benzene. Still, the coincidence involved in the formation of a molecule so complex as to be called *living*, must be, so far as we can make out, a very elaborate coincidence. How often does it happen in a cubic mile of sea-water? Perhaps once a week; perhaps once in many centuries; perhaps also, many million times a day. From this living molecule to a speck of protoplasm visible in the microscope is a very far cry; involving, it may be, a thousand years or so of evolution. Possibly, however, the molecule has from the beginning that power which belongs to other chemical bodies, and certainly to itself when existing in sensible masses, of assisting the formation of its like. Once started, however, there it is; the spontaneous generation, believed in as a possibility by the evolutionist, has taken place.

Why then do the experiments all 'go against' spontaneous generation? What the experiments really prove is that the coincidence which would form a *Bacterium*—already a definite structure reproducing its like—does not occur in a test-tube during the periods yet observed. Such a coincidence is the nearest thing to a 'special creation' that can be distinctly conceived. The experiments have nothing whatever to say to the production of enormously simpler forms, in the vast range of the ocean, during the ages of the earth's existence.

Allowing that this makes the thing possible, does it give any reason for believing that it has actually taken

place? We might get a direct demonstration if we knew the constitution of protein, and could calculate the chances of the coincidence which would lead to its formation in the sea. But on the other hand we have an argument precisely like that which we used in the case of the descent of man. We know from physical reasons that the earth was once in a liquid state from excessive heat. Then there could have been no living matter upon it. Now there is. Consequently non-living matter has been turned into living matter *somehow*. We can only get out of spontaneous generation by the supposition made by Sir W. Thomson, in jest or earnest, that some piece of living matter came to the earth from outside, perhaps with a meteorite. I wish to treat all hypotheses with respect, and to have no preferences which are not entirely founded on reason; and yet, whenever I contemplate this

simpler protoplastic shape
Which came down in a fire-escape,

an internal monitor, of which I can give no rational account, invariably whispers 'Fiddlesticks!'

I think, however, that the nature of the evidence which makes spontaneous generation probable is such that we cannot teach it in schools except to very advanced pupils. And the same thing may be said of the doctrine of evolution as a whole, regarded as involving the nebular hypothesis.

'Those who hold (says Tyndall) the doctrine of evolution are by no means ignorant of the uncertainty of their data, and they only yield to it a provisional assent. They regard the nebular hypothesis as probable, and in the utter absence of any proof of the illegality of the

act, they prolong the method of nature from the present into the past. Here the observed uniformity of nature is their only guide. Having determined the elements of their curve in a world of observation and experiment, they prolong that curve into an antecedent world, and accept as probable the unbroken sequence of development from the nebula to the present time.'

When I was seven or eight years old, I came across an article in *Chambers' Journal* upon Plateau's experiments with rotating oil-drops, and their bearing on the nebular hypothesis. I was highly delighted with this, and made notes of it on the fly-leaves of a book of Bible stories. My notion was that creation was precisely a large Plateau's experiment. Now I am pretty sure that this unfortunate circumstance retarded my knowledge of the nebular hypothesis by some years, because it gave me an idea that I knew all about it already.

Besides the nebular hypothesis, there are other doctrines about the origin of the world which it seems undesirable to have taught to our children. One[1] is an account of a wet beginning of things, after which the waters were divided by a firm canopy of sky, and the dry land appeared underneath. Plants, and animals, and men, were successively formed by the word of a deity enthroned above the canopy. Another account is of a dry beginning of things, namely a garden, subsequently watered by a mist, in which there were no plants until a man was put there to till it. This man was made from the dust of the ground by a deity, who walked about on the earth, and had divine associates,

[1] See that admirable book, *The Bible for Young People* (Williams & Norgate, 1873).

jealous of the man for sharing their privilege of knowing good from evil, and fearful that he would gain that of immortality also. The deity had taken a rib out of the man, and made a woman of it.

I do not see that we should mind the teaching of these stories, so long as others are taught along with them, such as that of the Chaldee God Bel, who cut off his head, moistened the clay with his blood, and then made men out of it; or of the Gods of our own race, Odin, Vale, and Ve, who walked about the earth until they found two trees, one of which they made into a man, and the other into a woman; or of Deucalion and Pyrrha, who threw stones over their heads, which became men and women. As soon as ever they can understand them children may be taught the reasons why the first two stories are quite different from the others, and, though contradictory, both of them true; as, for example, the nature of the evidence which connects or disconnects the stories with Moses, and which proves that Moses could have known anything about the origin of the world. But we ought not, I think, to allow either of these stories to be taught to our children *as a known fact.* It will be better to prepare them that they may by-and-by understand the attitude of the lover of truth towards these problems.

'If you ask him whence is this "matter" .... who or what divided it into molecules, and impressed upon them this necessity of running into organic forms, he has no answer. Science is mute in reply to such questions. But if the materialist is confounded, and science is rendered dumb, who else is prepared with an answer?

Let us lower our heads and acknowledge our ignorance, priest and philosopher, one and all.

'His (the scientific man's) refusal of the creative hypothesis is less an assertion of knowledge than a protest against the assumption of knowledge which must long, if not for ever, lie beyond us, and the claim to which is the source of perpetual confusion upon earth'[1]

I do not propose to discuss here those difficult questions which were raised by Häckel and Nägeli about the relation of body and mind; because I hope soon to have an opportunity of dealing with them separately. But in regard to the teaching in schools of abstract and general conclusions derived from this branch of science still so very imperfect, so much in the air, it seems to me that Virchow has spoken with the utmost practical wisdom. The basis of it, indeed, the one point of firm ground on which the structure of mind-and-body lore can be built, is fully suited for teaching, as Virchow himself has pointed out. The theory of the eye, slowly elaborated from Lionardo to Kepler, from Kepler to Helmholtz, and the doctrine of perception founded upon it, these supply a safe foundation for whatever more may come. But the Plastidule-soul can take no harm by waiting awhile, until we are a *little* more clear about what we mean by it.

And this same judgment applies necessarily to another abstract and general conclusion from an unproved doctrine about body and mind; the conclusion that a man's consciousness survives the decay of his body. Such a conclusion can be at best, in the present state of knowledge, a hope, a conjecture, an aspiration;

[1] Tyndall, *Fragments*, pp. 421, 548.

it can have no claim to be regarded as a known fact. Those who hold to it may think it highly probable, they may strongly desire that it should be true, they may eagerly expect that better evidence will shortly be forthcoming; but they cannot be justified in teaching it to little children as a known fact. Of such a doctrine, surely, if of any doctrine, we ought to say: 'Do not take this for established truth; be prepared to find that it is otherwise; only for the moment we are of opinion that *it may possibly be so*.'

And in this case the reasons for such caution are deeper and stronger than the merely intellectual ones, because of the vast hold of this doctrine upon the hearts, and its serious influence upon the actions, of men. You, who teach it to your children, do so from the highest of motives, because you believe that it will influence their character for good, and strengthen them in the course of right conduct. But there are two things which you should carefully consider. The first is, that by teaching the doctrine too early you weaken its effect, because you teach it while it can be only half realized, and so prevent it from being realized afterwards. Dr. Martineau testifies to the greater power of a belief in immortality gained by the believer for himself, and strengthening a moral sense which has been formed on a different basis. Teach your children to do good and to eschew evil; if in later life they can find hope of an eternity of such action, it will make them happier and may make them better. But the experience of centuries condemns the practice of teaching the doctrine to little children, so as to make it familiar as an ill-understood conception, to weaken the power it might have for

good, and to help the perversion of it to superstitious uses.

The second point to be considered is the frightful loss and disappointment you prepare for your child if, as is most probable in these days, he becomes convinced that the doctrine is founded on insufficient evidence. It is not merely that you have brought him up as a prince, to find himself a pauper at eighteen. He may have allowed this doctrine to get inextricably intertwined with his feelings of right and wrong. Then the overthrow of one will, at least for a time, endanger the other. You leave him the sad task of gathering together the wrecks of a life broken by disappointment, and wondering whether honour itself is left to him among them. Leave him free of this doctrine, and his conscience will rest upon its true base, safe against all storms ; for it is built upon a rock. Then he can never reproach you with raising hopes in him which knowledge is fated to blast, and with them, it may be, to blast the promise of his life.

THE END.

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